Quick Reference Guide

Sartorius Manual Cubis® Comparators

Electronic Mass Comparators
Model MCM

98648-020-14

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This **Quick Reference Guide** will help familiarize you with the operation of the mass comparator, introduce you to the Q-Guide operating design and offer you examples of how to perform simple tasks.

The **user manual** additionally contains:
- A “safety instructions” chapter
- A description of all operating processes
- A description of all applications
- Cleaning and care instructions
- Maintenance and repair instructions
- Information on disposal
- Technical data

Notes on Using This Quick Reference Guide

- ▶ Please read the instructions carefully and completely before using the device.
- ▶ Read the safety precautions carefully.
- ▶ This Quick Reference Guide is part of the product. Keep them in a safe and easily accessible location.
- ▶ If the instructions should be lost or misplaced, please contact Sartorius for a replacement or download the latest version from our website: www.sartorius.com

Symbols and Signs

The following symbols are used in this manual:

	This instruction denotes a possible danger with medium risk that death or severe injury may result if it is not avoided.
	This symbol denotes a possible danger with risk that moderate or minor injury may result if it is not avoided.
	This symbol denotes a danger with low risk that could result in property damage if the risk is not avoided.
	This symbol – is an indication of a function or setting on the device. – is an indication that caution should be exercised while working. – identifies useful information.
	The hand symbol indicates operating steps that involve touch screen controls.
( )	This symbol means that the USER key should be pressed.
( )	This symbol means that the TASK key should be pressed.
	When individual buttons are displayed, they should be pressed.

- ▶ Indicates a required action
- ▷ Describes the result of an action
1. If a procedure has multiple steps,.
2. ...the steps are numbered consecutively.

– Indicates an item in a list

Other Documents

In addition to this quick reference guide, there is also an installation manual which is supplied along with the device. (Enclosed as a hard copy).

Hotline/technical advice on applications:

Phone: +49.551.308.4440
Fax: +49.551.308.4449

Safety Instructions

The mass comparator complies with the regulations and standards for electrical equipment, electromagnetic compatibility and the stipulated safety requirements. Improper use or handling can, however, result in damage and | or injury.

The equipment may only be operated by trained personnel. Operators must read these installation instructions, particularly the safety information, and must be familiar with the operation of the equipment. These safety precautions must be supplemented by the operator as required. The operating personnel must be instructed accordingly.

Before working with the mass comparator, it is imperative that you read the chapter on "Safety Instructions" in the enclosed installation instructions!

Sharp or pointed instruments (such as ballpoint pens) can damage the device!

The touch screen should only be operated by lightly pressing it using the tips of your fingers. You can also operate the touch screen when wearing lab gloves.

Intended Use

The Cubis® models MCM with the "Mass Calibration" application were developed as mass comparators especially for use in testing institutes and calibration services.

Each model covers a certain weight range, see Chapter "Technical Data" in the user manual.

The Cubis® models are designed to be used exclusively indoors. They can be operated standalone, connected to a PC or in a network.

Operating the Mass Comparator

IMPORTANT!

Damage to the device due to being improperly secured during transportation!

Mass comparators with motorized substitution weight should be switched to the standby mode each time before they are transported.

Turning the Mass Comparator On and Off

(⏻)

- ▶ Make sure the mass comparator has been installed and put into operation in accordance with the installation instructions.
- ▶ Press the button (⏻) on the control unit.
- ▷ The start screen appears briefly on the screen and then the user interface appears.

  The user interface initially appears in German. It is however possible to change the language setting (see “Configuring Display and Control Unit Properties” on page 59).

On subsequent starts, the most recent active user profile and task are opened (if at least one user profile and task have been set up).

(⏻)

- ▶ Level the mass comparator, if you are prompted to do so (see Chapter “Leveling the Mass Comparator”).
- ▶ To put the mass comparator in the standby mode or to switch it off, press the key (⏻).
- ▶ Close the draft shield (if your model has one).

Operating Design: Q-Guide

The Cubis® mass comparators are equipped with an application software with interactive operator guidance. Once you open a menu or select an application, brief instructions appear on the display to guide you through the menu or application step-by-step. At each step along the way, the display shows only those options that are relevant to your process; this helps prevent unnecessary “detours” and enables you to reach your goal more quickly.

This type of user guidance is mostly intuitive. Although operation of the mass comparator is mostly intuitive, this quick reference guide includes a section with very detailed, step-by-step instructions where you can learn about all of the available options (see Section “Creating User Profiles” in Chapter “User Management”).

Basic Operational Structure

The most basic functions, weighing and taring, can be carried out as soon as the mass comparator is switched on. The application software is divided into three general areas, in which individual settings can be configured:

Task Management

In Task Management (from page 14) task profiles with specific applications, device settings and printout settings can be configured:

Task Management TASK (☰)	Configuration	See
Select application, start	configured at factory	page 19
Configuring tasks	configurable by user	page 16

User Management

In User Management (from page 65) user profiles with specific configuration settings and user rights can be set up. You can also set up password protection to meet your security requirements. The mass comparator can also be used without user management.

User Management USER (👤)	Configuration	See
Selecting user	configured at factory	page 13
Creating user profiles	configurable by user	page 65

System Settings (Menu)

System settings (Menu) contain all basic settings and parameters which are used to operate the mass comparator, have an effect on its entire operation and can also be used as a template for creating new tasks.

System settings	Configuration	See
System settings	user-configurable, in some cases only with administrator rights	from page 48

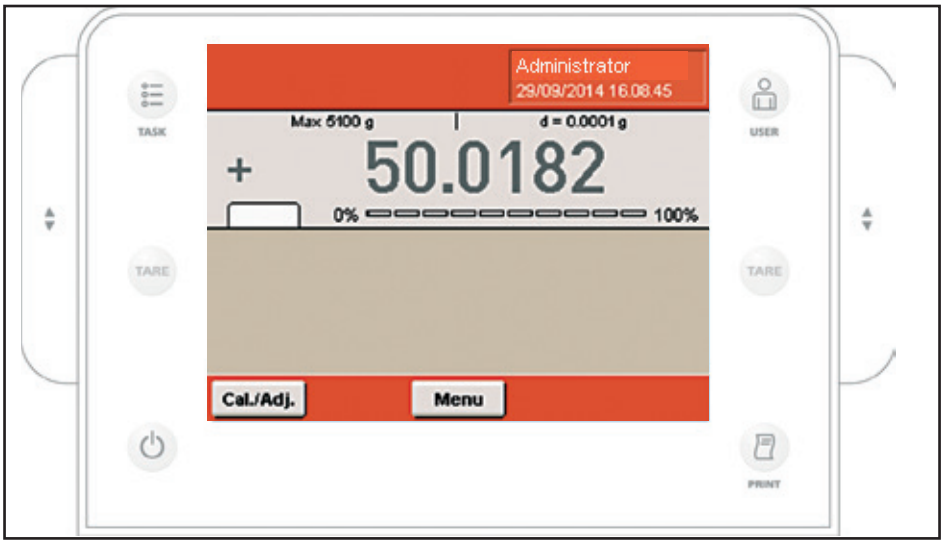
Using the “Wizard"

You can choose between two display types in some menus:

The overview lists all parameters with their set options. You can select each individual option to change its setting.

When you activate the Wizard in the same menu, the program guides you onwards **step by step**: The individual parameters with their options are displayed in succession.

Using the Display and Control Unit



Control Keys

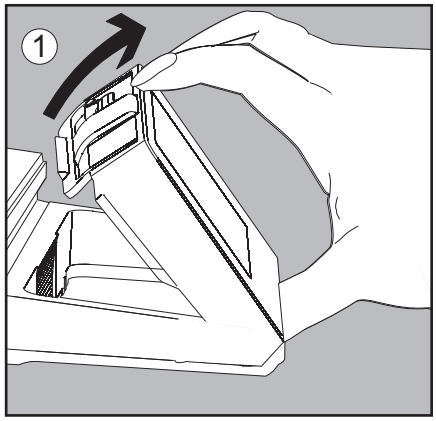
(☰)	TASK key: Opens Task Management, in which tasks can be selected and defined. While working in this menu, you can also use the TASK key to cancel at any time and return to task overview.
(👤)	USER key: Opens User Management, in which user profiles can be selected and user settings defined. While working in this menu, you can also use the USER key to cancel at any time and return to user overview.
(TARE)	TARE keys - left and right: Zeroing and taring
(🖨)	PRINT key: Used to print the currently displayed measurement results or a user-specific printout.
(⏻)	Control key: to turn on and switch to standby
▲ ▼	Operating elements for electronic draft shield (depending on the model)

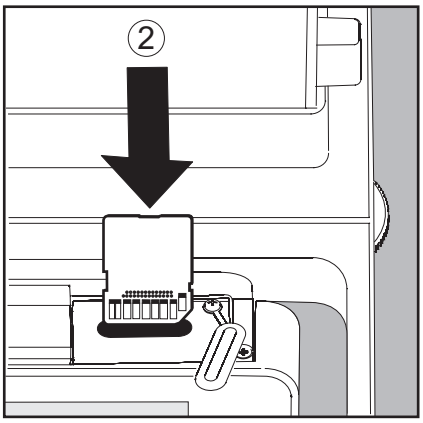
Setting up the Display and Control Unit

The tilt angle of the display and control unit can be set as desired to enable optimal readability for changing working conditions. The color and brightness of the display can also be changed to match the illumination in the room (see “User Management” and “System Settings”).

Inserting Memory Cards into the Display and Control Unit

The slot for the SD card is located at the back of the display and control unit.





1. Tilt the control unit until it is nearly vertical.
2. Swivel the cover of the card slot to the front. Align the SD card so that the contacts are facing forwards and upwards.

   For the sake of clarity, the illustration shows reversed view of the display and control unit.
3. Insert the card into the slot as far as it will go.

▶ To remove the card, press it against the resistance in the direction of the slot so that the card springs out.

4. Press the position retainer and swivel the display and operating unit back into the desired position.

Quick Guide: First Weighing

(⏻)

▶ To turn the mass comparator on, press the button (⏻).

▶ Close the draft shield (if available).

▶ Before the first weighing, check the level indicator and level the mass comparator if necessary (see Chapter "Leveling the Mass Comparator").

(TARE)

▶ To tare the mass comparator, press the tare key (TARE).

▷ The mass comparator is tared and the value displayed is zero.

▶ If required, open the draft shield and carefully place the sample (test weight or reference weight) on the weighing pan.

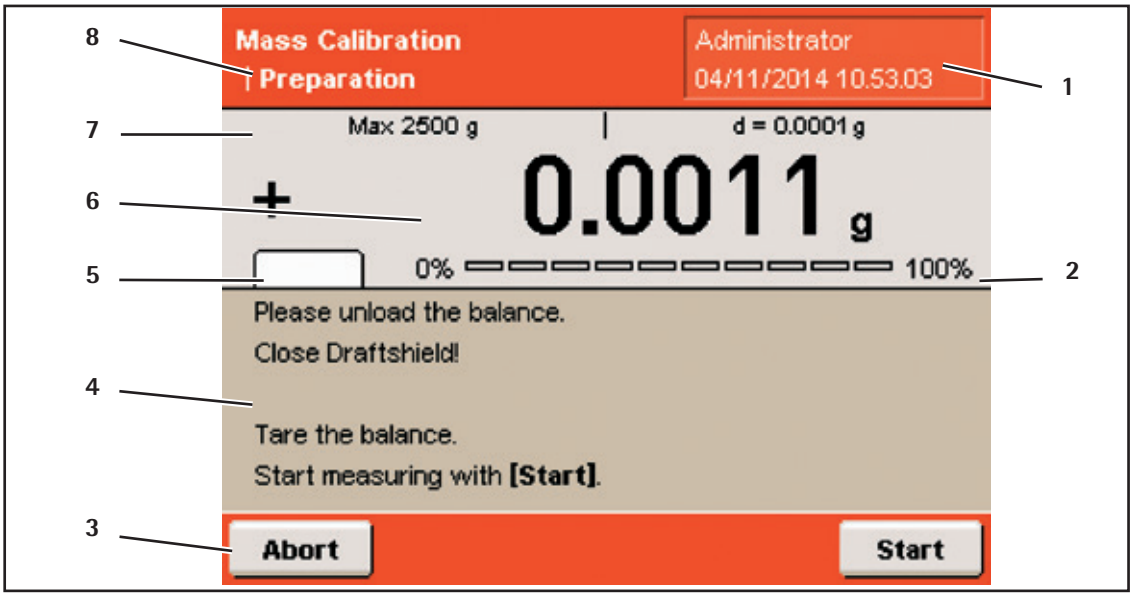
▶ Close the draft shield (if available).

▷ You can read the measured value as soon as the measurement value stops changing and the unit is displayed. The font color of the numbers changes from gray to black.

User Interface (Touch Screen)

Many operating steps are carried out via the display using the touch screen. The display varies depending on whether the application software is in operating mode or a menu is currently open (setup mode).

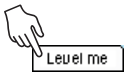
Display in Operating Mode



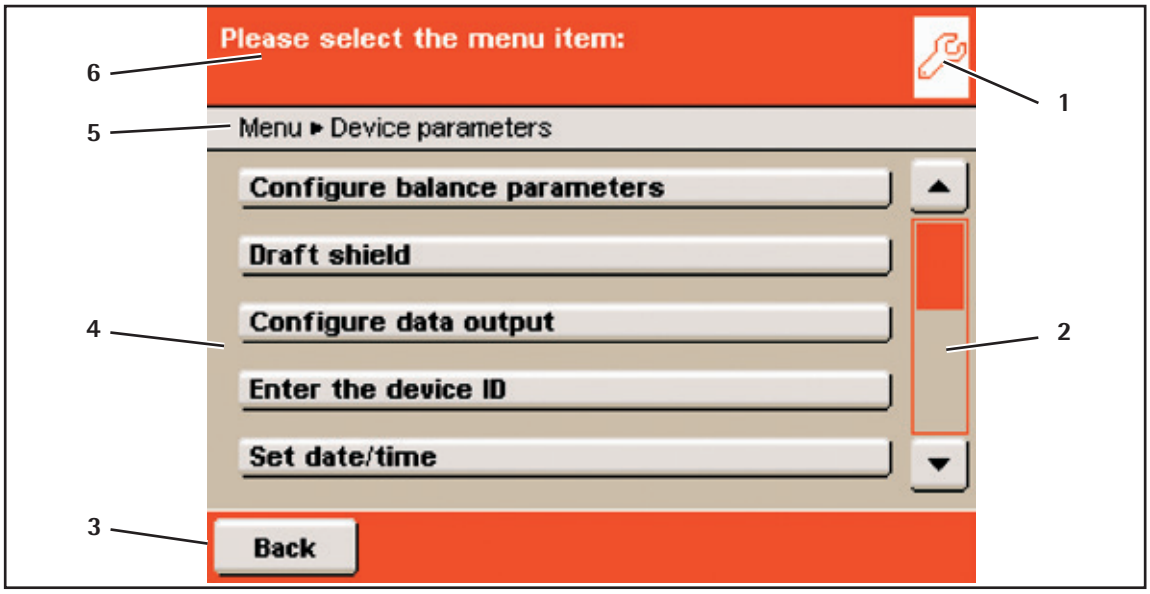
1	User field displays the current user, date and time - Touching this area displays the user description
2	Scaled measurement value display (percentage of weighing capacity utilization)
3	Toolbar with currently available buttons
4	Task area with instructions on how to proceed
5	Field for status and warning messages (see below)
6	Value range with current measurement value (the numeric value is displayed in black numbers once the weighing system reaches stability; beforehand it is displayed in gray)
7	Metrology line left of the weighing capacity (“Max”), to the right “d” readability (resolution) of the mass comparator
8	Function display current task (here: Preparation mass calibration) - Touching this area displays the description of the application

Status and Warning Messages

Tabs with the following messages may be displayed here:

	isoCAL is displayed: isoCAL is active **isoCAL** flashes: Adjustment required Touch the tab to activate the function.
	**Level me!** flashes: The mass comparator is not straight, leveling required Touch the tab to activate the function.
	Service: The next scheduled maintenance date has been reached. Touch the tab to view details of your contact person at Sartorius.
	GLP: GLP print is active, the header will be printed. Touch the tab to print the footer.

Display in Setup Mode



1	Symbol indicating which menu (TASK, USER or MENU) is currently open
2	Scroll bar to view the entire selection area
3	Toolbar with currently available buttons
4	Selection area with selectable options
5	Orientation line shows the current menu level
6	Interaction area with instructions on how to proceed

Using the Touch Screen

IMPORTANT!

Sharp or pointed instruments (such as ballpoint pens) can damage the device!

The touch screen should only be operated by lightly pressing it using the tips of your fingers. You can also operate the touch screen when wearing lab gloves.

All operating buttons on the touch screen are depicted in a light plastic surface. They are activated with a light touch.

Alternative selection: When only one of several options is available, always touch the desired option and the program will automatically switch to the next view.

Multiple selection: When several options are available for selection, each option will have a checkbox. You can select or deselect the desired option by touching the checkbox (adding or removing the checkmark).

Touch **Next** to go to the next query.

For some displays you will need to use the scroll bar to view all options. You can either slide the bar (touch it and pull in the desired direction) or touch the up or down arrow keys.

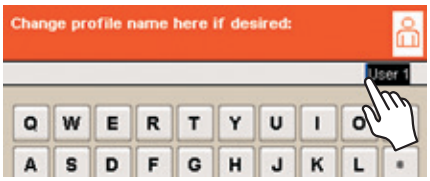
Entering Text and Numbers

A keypad will appear whenever you have to enter text and numbers. A cursor appears in the entry line above the keypad.

- ▶ Select the desired characters with a light touch.
- ▷ The text entered will appear in the entry line.

Press the ‘Shift’ button to change the input mode between uppercase letters, lowercase letters, numbers and the complete character set with special characters.

The ‘backspace’ key is used to delete the character to the left of the cursor.



Touching the input line toggles the input mode.

Overwrite mode: The cursor now marks a character or the entire entry. The marked text will be overwritten by the new entry.

Input mode: The cursor is positioned in the blank space between characters so that you can enter more characters.

Use either of the arrow keys to move the cursor one space to the left or to the right.

The Back key cancels the entry process and takes you back one step to the last view.

The OK key ends the process and saves character input.

Opening and Closing the Draft Shield

Operating elements for the electronic draft shield (depending on the model)

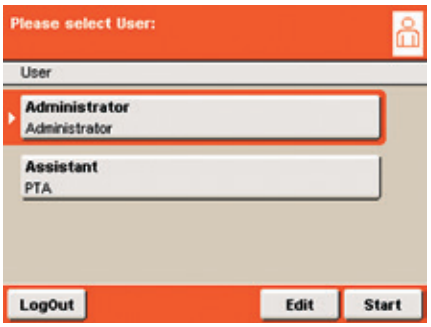
The operating elements are located to the left and right sides of the control and display unit, see figure on page 7.

You can open and close the draft shield with the UP/DOWN keys on the control and display unit.

Activating/Switching Users

In the operating mode, the active user is displayed in the user field in the upper right-hand corner of the display. To activate another user profile, open the User Management menu.

( )



- ▶ Press the key USER ( ).
- ▷ The user selection is displayed. The current, active user can be recognized by the small arrow and the dark background.
- ▶ Touch the user you want to activate.
- ▷ The program switches back to operating mode with the selected user is logged in with his access rights.
- ▶ When you touch **Start** the user who is currently selected will be activated.

Task Management

In the Task Management menu (TASK) you can

- start a task,
- configure a new task and
- edit an existing task (modify, copy, delete).

Some applications like weighing, density determination, statistics etc. are available to you for a task, see User Manual. Each task contains at least one of these applications. However, it can also have a combination of several applications. Each application can be used either with its factory settings or you can modify it as desired. The weighing application is available as a basic function for every task. Each task also contains the individual settings and the individually configured printout.

Which options are available to a given user in the task management depend on the user's rights: An administrator can use all options, while a user can only use limited options (see "User Management" in Chapter User Management). If no users have been defined, all options can be accessed; there are no limitations. A maximum of 15 tasks can be created.

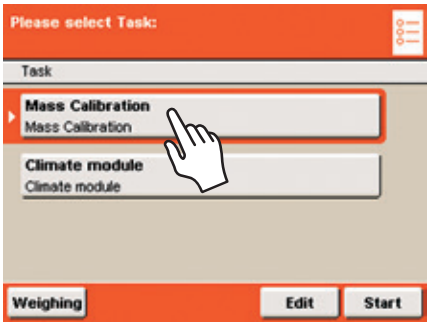
The administrator can create tasks with restricted use, i.e. tasks that can only be used by certain users or only by the administrator himself.

Global tasks can be used by all users.

Some tasks are only accessible to the user who created them. Exception: A user can copy global tasks to use them afterwards as a local task.

Option	Administrator	User
Configure, modify, delete own tasks		☑
Configure, modify, delete global tasks	☑	
Execute, copy local tasks		☑
Execute, copy global tasks	☑	☑

(☰)



▶ To switch to task management, press the **TASK** key (☰).

▷ The two pre-configured tasks (**Mass Calibration**, **Climate module**) are displayed.

You can change the names of the tasks according to your own preferences and add additional tasks.

▶ When you touch **Start**, the task currently selected will be started (indicated by the dark background).

▷ The text entered will appear in the entry line.

Importing Tasks:

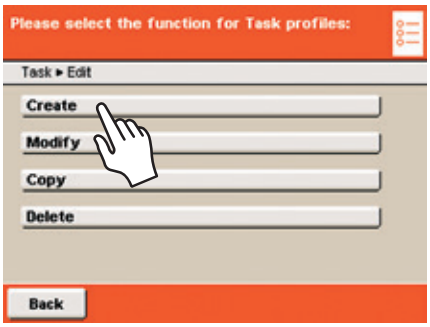
You can also load pre-configured tasks to the mass comparator:

1. Unpack the desired ZIP archive file to the root directory (Root Dir) of a SD card after download from the Sartorius homepage or from the enclosed CD.
2. In the mass comparator menu, access the sub-menu “Import/Export Data: Import Files from the SD Card.”
3. Insert the SD card into the mass comparator.
4. Select the appropriate import data (if applicable, navigate to the subdirectory **QAPP**) and touch **Next** to activate the loading of this task. Then exit the menu.
5. Start the loaded task via the selection list.

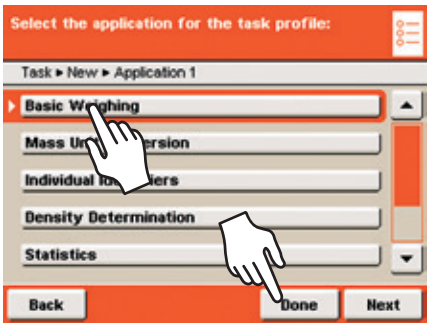
Using Applications with the Factory Settings

Each application comes with specific factory settings. If you wish to use the factory settings, you can use the quick method for configuring a task:

▶ Open Task Management and touch **Edit.**



▶ Select **Create**.



▷ An application list is displayed.

▶ Select the application you want to assign to the new task.

▶ Touch **Done**.

▶ Enter a name and description for the task and then touch **Save**.

▷ The new task is saved with the factory settings and is displayed in the task list.

Sorting the Task List

New tasks are always added to the end of the task list. After you have already configured several tasks, it may be helpful to sort the selection list.

(☰)

▷ The task selection is displayed.

▶ Touch **Sort.**

▷ The list is sorted alphabetically (A - Z).

▶ To reverse the sorting order touch **Sort.** once again.

▶ To sort tasks by the date of last use, touch **Sort.** once again.

Creating (Configuring) New Tasks

The following applications are included in the Cubis® software. You can configure them as tasks according to your requirements and preferences.

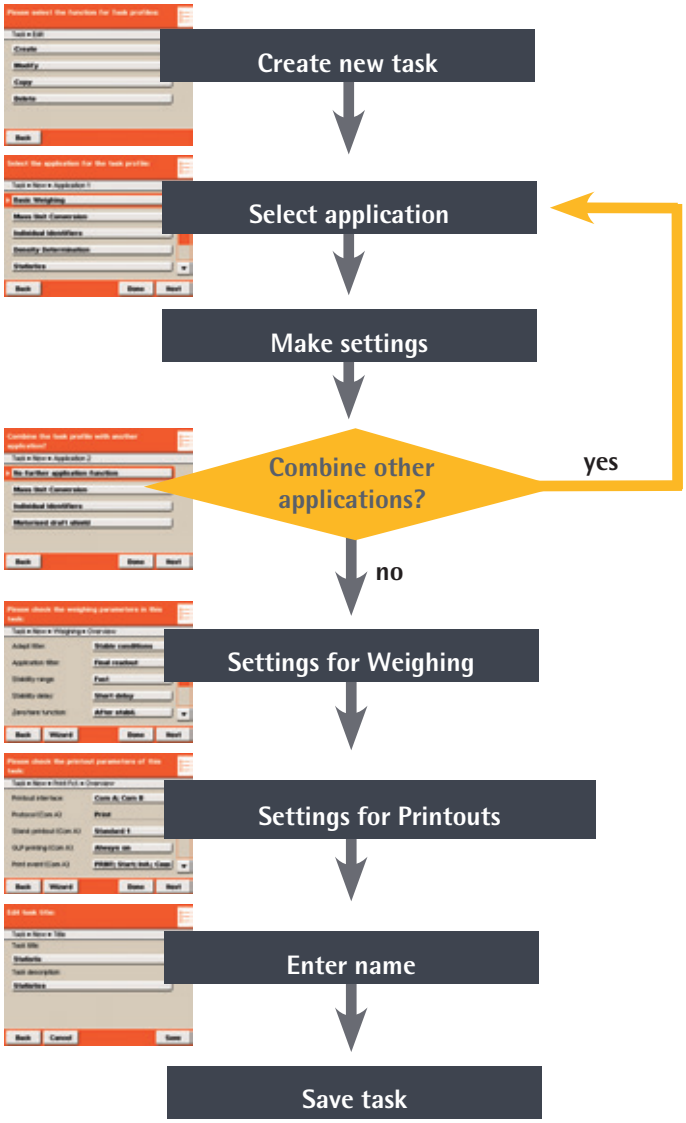
- Weighing
- Mass unit Conversion
- Individual identifiers
- Density determination
- Draft shield (optional)
- Individual sequence (Q-App)

The basic process for task configuration is as follows:

1. Create a new task.
2. Select application.
3. Complete all following prompts and if applicable make own entries for the required parameters.
4. If applicable, perform steps 2 and 3 for additional applications if you would like to combine multiple applications.
5. Check settings for the weighing and for the printouts, and modify as required.
6. If you are an administrator, define whether the new task can be used by all or only by certain users.
7. Enter a name and description for the new task.
8. Save task.

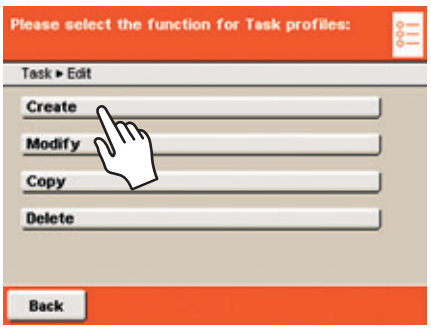
Flow Chart "Configuring a Task"

If the **Back** button is visible on the display, you can navigate backwards.

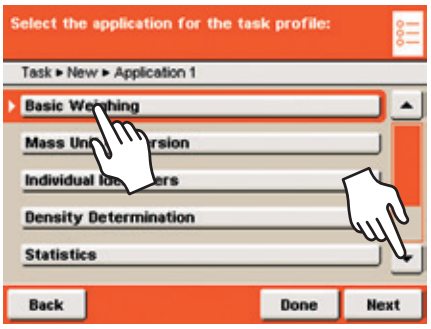


Example: Creating a Task

▶ Open Task Management and touch **Edit**.



▶ To define a new task, select **Create**.



▷ An application list is displayed.

▶ To view all applications, use the scroll bar on the right.

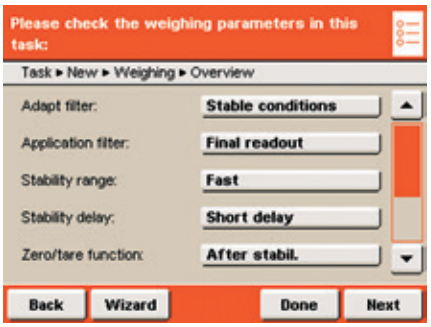
▶ Select the application you want to assign to the new task.

▶ Configure this application as required. The program guides you through the configuration menu.

▶ If you want to assign additional applications to the task, these applications should also be configured (see “Combining applications into one task”).

▷ After all applications for the new task have been configured, the following two parameters have to be set: Configure the settings for weighing and printouts. All settings configured here will only affect **the new task**.

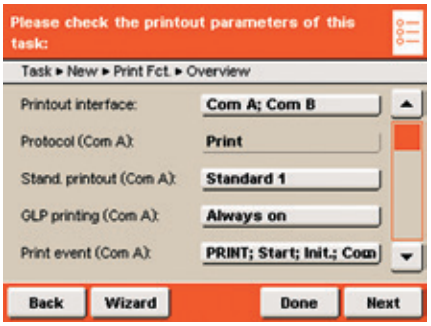
Settings for Weighing



▶ Check the settings and change them as required.
To find explanations for each of the options, first touch **Wizard** and then **Info**.

▶ Touch **Next.**

Settings for Printouts


Please check the printout parameters of this task:
Task ▸ New ▸ Print Fct. ▸ Overview
Printout interface: Com A; Com B
Protocol (Com A): Print
Stand. printout (Com A): Standard 1
GLP printing (Com A): Always on
Print event (Com A): PRINT; Start; Init.; Com
Back
Wizard
Done
Next

▶ Check the settings and change them as required.
To find explanations for each of the options, first touch **Wizard** and then **Info**.

▶ Touch **Next.**

▶ Enter a short name and a description for the new task.

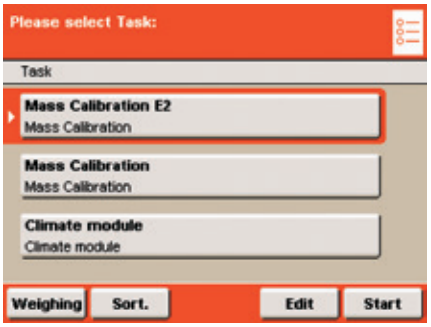
▶ Touch **Save**.

▷ The task selection with the new task is displayed.

Executing Tasks

After all required settings have been configured, you can now start and execute a task.

(☰)



- ▶ If you haven't already done so, go to Task Management.
- ▷ The task selection list is displayed.
- ▶ Touch the task of your choice

or:

- ▶ If the desired task has already been selected, (dark background and arrow on the left), touch **Start**.
- ▷ The program switches to the operating mode and the selected task is activated.
- ▶ Follow the instructions on the display.

In this Quick Reference Guide, we only describe the applications "Weighing" and "Mass Calibration". For complete description of all applications, please refer to the full user manual on the enclosed CD-ROM.

Weighing

Purpose

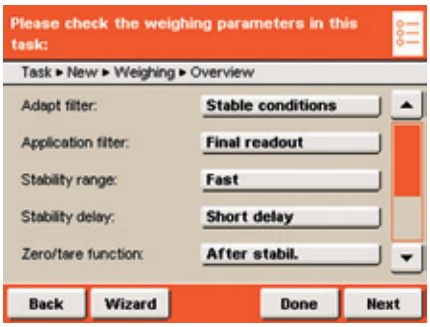
Weight determination within the scope of the device-specific weighing capacity (see “Technical Data”)

Combination Options

“Mass Unit Conversion” and “Individual Identification”

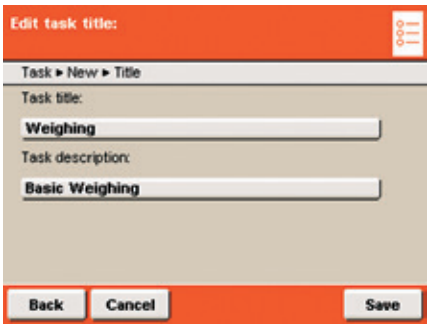
Configuring a Task: My Weighing

- ▶ If you have not already done so, switch over to Task Management and touch **Edit**.
- ▷ You can create, modify, copy and delete a task profile.
- ▶ Touch **Create** and select the application for the task profile, in this case **Basic Weighing.**



If you want to set up the weighing function without combining it with another application:

- ▷ The settings for **Basic Weighing** are displayed.
- ▶ Check all settings and change them as required.
- ▶ Touch **Next.**
- ▷ The settings for the **Printouts** are displayed.
- ▶ Check all settings and change as required.
- ▶ Touch **Next.**
- ▶ If you are an administrator: Define whether all or only certain users may use this task.
- ▶ Touch **Next.**



- ▶ Enter a short name and a description for the new task (e.g. “My Weighing”).
- ▶ To save the new task, touch **Save**.

Executing Tasks: My Weighing

- ▶ If you haven’t already done so, go to Task management.
- ▷ The task selection is displayed.

- ▶ Touch the desired task, or, if the desired task has already been selected touch **Start**.
- ▷ The program switches to the operating mode and the selected task is activated.

Mass Calibration

Purpose

The application “Mass Calibration” has been especially developed for use in metrology institutes and laboratories involved in mass and calibration in order to provide users with a simple, fast and comprehensive mass calibration process. The Cubis® models MCM are used as mass comparators with this application.

In a precisely conducted process sequence, according to OIML R111 and/or ASTM E614 the conventional mass value of the test weight and its uncertainty are determined by means of the comparison of a test weight (“Test piece”) and a reference weight (“Normal”). It is by this means that the test weights can be traced back to international standards.

Configuration Options

In the ex-factory state, the Cubis® MCM models have a pre-defined mass calibration task which you can use immediately or customize to your requirements.

The “Mass Calibration” application offers vast scope for configuration. You can, for example, select the standard applied (OIML or ASTM), modify the parameters for timer control and define the uncertainty parameters required. The scope and additional information such as order data and test weight data in the output log can be selected individually. Besides this, the application has a database for saving your reference weight data and a material database according to OIML R111, which can be expanded to include your own materials.

Requirements

In order to perform a mass calibration operation, you require a test weight and a calibrated reference weight of the relevant mass.

The requirements for mass calibration in accordance with the standards of OIML and ASTM are taken into account in the processes by means of appropriate settings. However, the parameters selected and entered by you in this regard are not checked for plausibility.

Performing and Configuring a Mass Calibration

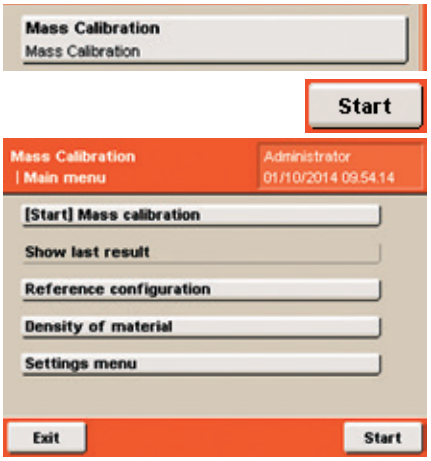
A task **Mass Calibration** is pre-configured at the factory itself. You can use this task immediately and modify the configuration even while it is being performed. If you want to create additional tasks for mass calibration, please read Chapter “Creating a Task: Mass Calibration” on page 26.

Executing Tasks: Mass Calibration

(☰)

▶ If you haven't already done so, go to task management.

▷ The task selection is displayed.



▶ Touch the task of your choice or:

▶ if the desired task is already selected, touch **Start**.

▷ The main menu is displayed after a few seconds.

In the main menu, the reference weights, materials and settings must now be configured via the menu items of the same names (see page 27). You will need the appropriate user access rights for these tasks. If these menu items are inactive (grayed out), you do not have user access rights for these tasks and must either change the user (see page 13) or have the required user access rights set up for you (see page 69).

If you have deselected the calculation of the uncertainties and the buoyancy correction in the settings menu, the tasks do not have to be configured.

▶ To start the mass calibration, touch **[Start] Mass Calibration** or **Start**.

▷ Depending upon the default settings, the order data, header or process data are displayed:

▷ This query about order data appears only if the **Input order data option** has been activated in the settings menu of the mass calibration (see page 32).

▶ Touch the buttons displayed.

▷ An option for entering order data is displayed.

The order data which you enter here are used only for orders of this task and are not available to other tasks. The order data in printed out in the logs.

- **Customer**: Customer for the current task
- **Order number**: Number of the order
- **Order Ident.**: Name of the order
- **Remark**: Comments about the order

▶ Touch **Continue**.

▷ The query about the header data of the test weight is displayed only if the **Input head data option** has been activated in the settings menu of the mass calibration (see page 32).

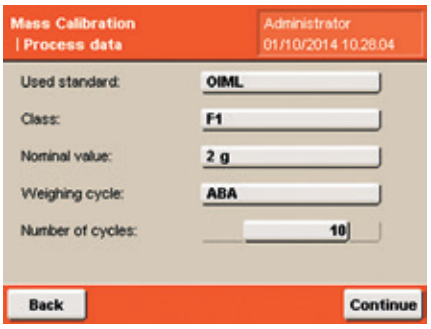
▶ Touch the buttons displayed.

▷ An option for entering header data is displayed.

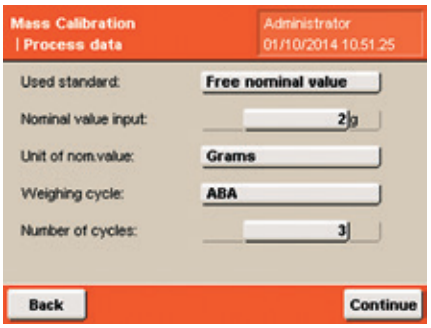
- **Manufacturer**: Manufacturer of the test weight
- **Identification**: Description of the test weight
- **Serial number**: Serial number of the test weight
- **Shape**: Form or shape of the test weight (e.g. Knob Weight)

▶ Touch **Continue**.

The process data which will be described in the next steps can only be modified if the user has the appropriate user access rights.

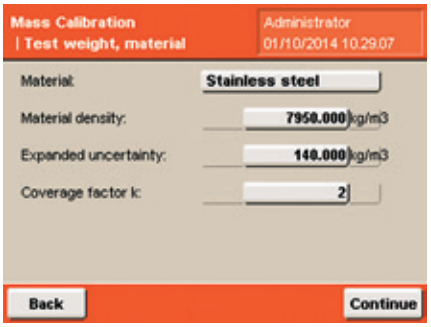


- ▶ Select the weighing cycle, enter the process data and modify it if required. Touching the values will take you to a selection.
  - **Used standard**: **OIML**, **ASTM** or **Free nominal values**
  - **OIML/ASTM**: If these standards have been selected, the accuracy class will also be displayed
  - **Class**: Class according to OIML or ASTM
  - **Nominal value**: Selection of the nominal value
  - **Weighing cycle**: Selection of the weighing cycle **ABA, ABBA** or **AB...BA** (see Chapter “Selecting the Weighing Cycle” on page 34)
  - **Number of cycles**: Number of passes of the selected weighing cycle (only in case of **ABA** or **ABBA**)
  - **Num. of test weights**: Select the number of test weights (only in case of **AB...BA**)
- ▶ Touch **Continue**.



If you have selected **Free nominal values** as the default:

- ▶ Touch **Nominal value input** and on **Unit of nom. value**, to enter the values.
- ▶ If you have not already done so, select the **Weighing cycle** and the **Number of cycles**.
- ▶ Touch **Continue**.



- ▶ Check the material data of the test weight displayed, and modify if required.
  - **Material**: Display of the material of the test weight. You can access a pre-configured selection by touching it. If you want to create a new material, open the main menu of the mass calibration and define a new material (see page 30).
  - **Material density**: Display of the density of the selected material; by touching it, you can access an input field and enter an individual value for the density.
  - **Expanded uncertainty**: Display of the expanded uncertainty of the selected material; by touching it, you can access an input field and enter an individual value.
  - **Coverage factor k**: Factor for uncertainty of the density; the default is 2, you can enter an individual value.
- ▶ Touch **Continue**.

- ▷ An appropriate reference weight is proposed, if available.
- ▶ Check whether the reference weight displayed is correct. If multiple reference weights are available, you can open a selection list by touching it.

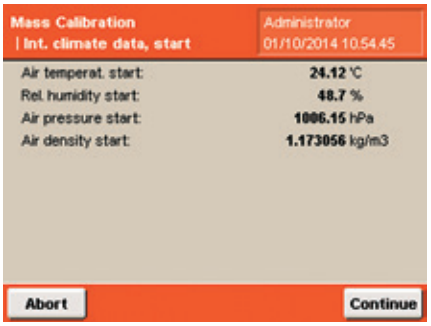
if so:

- ▶ Touch **Save**, to confirm the value of the reference weight entered, and to save the previously entered order data and configuration data.

If not:

If multiple reference weights have been defined for the nominal value of the test weight, the reference weight is selectable. Suitable reference weights are all weights with a higher accuracy class, at least, however, all E1- and / or. 000 weights of the appropriate nominal value.

- ▶ Touch the reference weight in order to be taken to a selection and to select a different reference weight; then confirm your selection with **Save**.
- ▶ Touch **Print**, if you would like to print out the configuration data at this stage, and on **Back**, to return to the view of the material of the test weight.



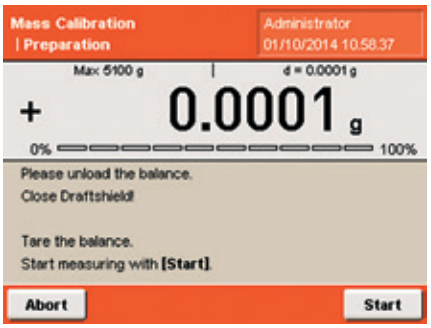
▷ If the test weight and the reference weight have been confirmed, the overview of the climate data is displayed:

If a climate module YCM20MC or YCM20MC-DAKKS has been connected to the device and if you have selected the use of the connected climate module in the settings menu, you can only read this data, but cannot modify it. If you have opted for the use of external climate date, the current data must be entered now.

- ▶ Check the climate data displayed.
- ▶ Touch **Save**, if you now want to perform the mass calibration with the values displayed.

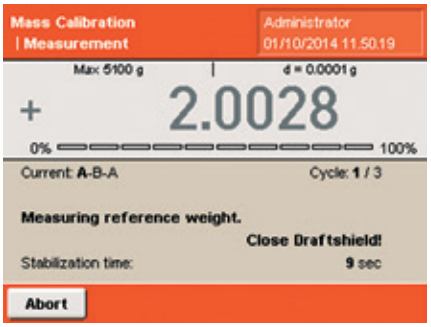
Please note that the following process will leave you just enough time for each step, as you have set in the settings menu. If the tolerance times are exceeded, the current measurement cycle will be aborted. This can however, be repeated if necessary.

- ▶ Keep the reference weight and the test weight ready before starting the mass calibration and ensure that there is no dust either on the weighing pan or on the weights. If required, carefully remove the dust with a soft brush. Use only appropriate lifting tools or wear gloves when loading the mass comparator.



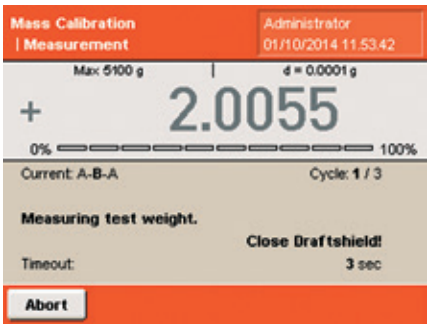
If the climate data has been confirmed, all required settings have been made. You can prepare the mass calibration:

- ▶ Unload the weighing pan, close the draft shield and tare the mass comparator.
- ▶ When you have completed the preparations, touch **Start**.



▷ You will now be prompted through the mass calibration process step by step.

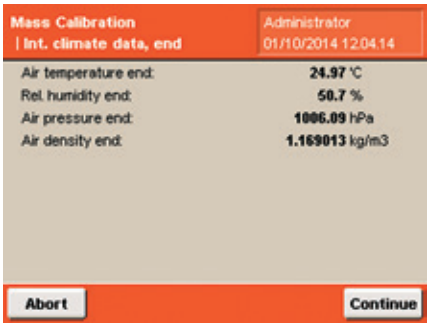
- "Weight A" is the reference weight, "Weight B" is the test weight.
- For your information, the display will indicate to which phase of the mass calibration the weighing cycle (e.g. **A**-B-A) currently taking place belongs, and the number of the weighing cycle (e.g. 1/3) currently being run.



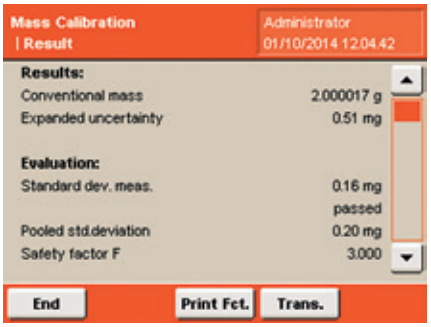
- ▶ Follow the instructions on the screen.
  - Place the weights carefully on the pan and remove them again, when prompted to do so.
  - Close the draft shield, if present, after the weights have been placed.
  - Complete each step within the allotted time. The remaining time is displayed on the bottom right corner of the screen.

If you exceed the tolerance time for the step of the mass calibration, the process terminates, and the message **Time overflow!** is displayed.

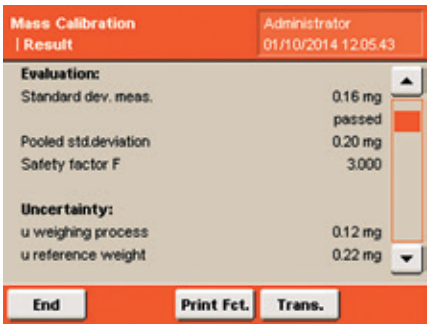
- ▶ If you want to repeat only the last completed cycle, of the current mass calibration, touch **Again**.
- ▶ If you want to start the entire mass calibration from scratch, touch **Abort**. You will be taken back to the main menu.



- ▷ At the end of the mass calibration, the overview of the current climate date is displayed. If you have opted for the use of external climate date, the current data must be entered now.
- ▶ Touch **Save**.



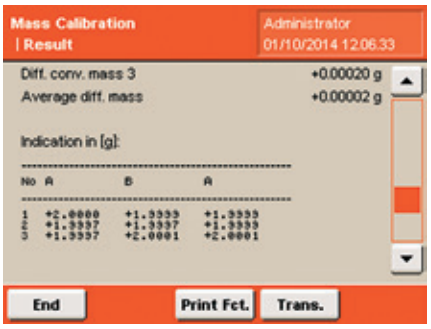
- ▷ The results of the mass calibration are displayed:
- ▶ Touch the scroll bar and scroll downwards to view all the results.



- ▶ Touch **Print Fct.** if you would like to print out the log of the results.
- ▷ You will get a printout of the results; You can view a sample printout in chapter “Printout/Sample Log” on page 35 .
- ▶ Touch **Trans.** (“Transfer”), if you want to save the results on an SD card. You must have inserted an SD beforehand card for this purpose. The results data are filed in a txt file which is readable both by people and computers.

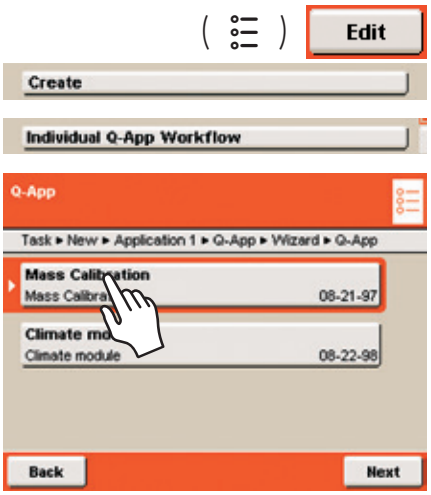
  The name of the txt file is composed of a time stamp, the order number, the serial number and the identification of the test weight.

  Example: “2014-07-31-17-32-11_999888777_03-0014_AAA.txt“



▶ Touch **End**, if you would like to return to the main menu.

Creating a Task: Mass Calibration

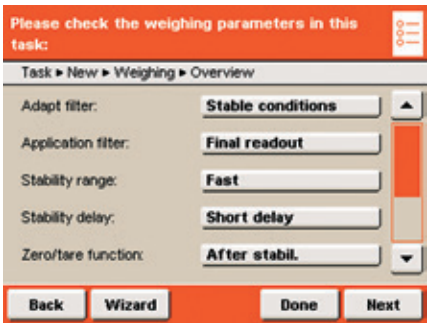


▶ Open Task Management and touch **Edit**.

▶ To create a new task, touch **Create**.

▶ Select **Individual Q-App Workflow**.

▶ Select the application **Mass Calibration**.

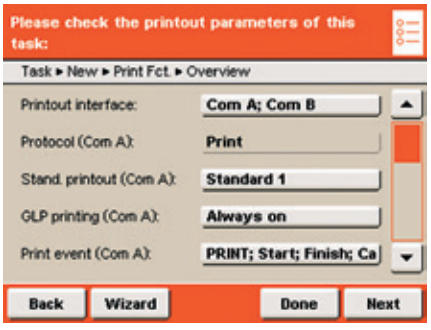


▶ Check the settings for the weighing and change them as required.

▶ Touch **Wizard**, if you would like explanations or help with the individual settings.

▶ Touch **Done**, skip the next step and switch directly over to user authorization.

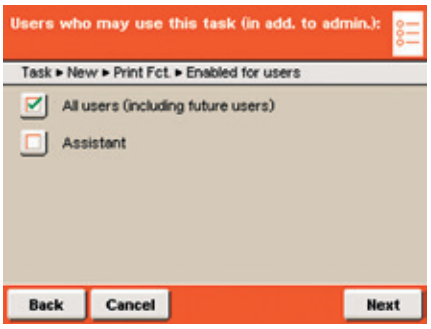
▶ Touch **Next**, if you want to check or modify the settings for the printout.



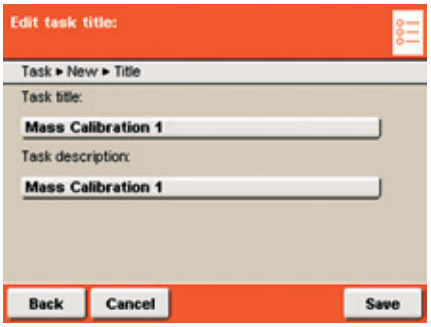
▶ Check the settings for the printout and change them as required.

▶ Touch **Wizard**, if you would like explanations or help with the individual settings.

▶ Touch **Done** or **Next**.


Users who may use this task (in add. to admin.):
Task ▸ New ▸ Print Fct. ▸ Enabled for users
All users (including future users)
Assistant
Back
Cancel
Next

- ▶ Select which users may use the task.
- ▶ Touch **Next**.



- ▶ Enter a short name, and if desired, a description for the new task.
- ▶ Touch **Save**, to save the new task.

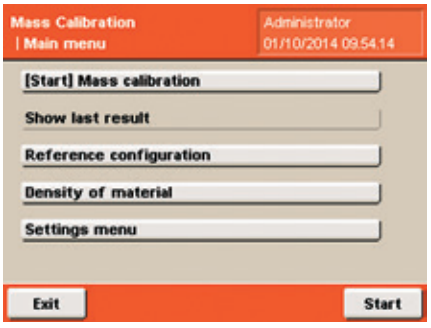
Configuring a Task: Mass Calibration

(☰)

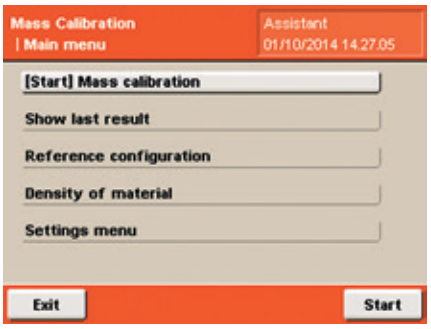
- ▶ If you haven't already done so, go to Task management.
- ▷ The task selection is displayed.

- ▶ Touch the task of your choice, or:

- ▶ If the desired task is already selected, touch **Start**.



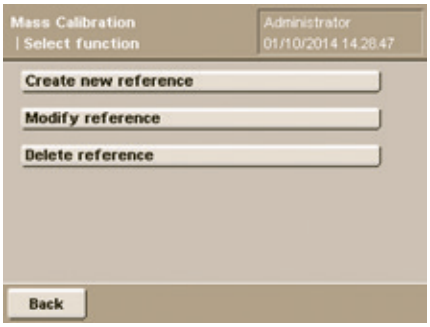
- ▷ The main menu is displayed after a few seconds. If you are logged on as an administrator, you can see:
  - **[Start] Mass calibration**: Start task.
  - **Show last result**: Get the results of the last mass calibration, if any.
  - **Reference configuration**: In the reference weights database you can edit reference weights and create your own reference weights (see the next sub-section "Create, modify or delete new reference weight").
  - **Density of material**: Create and edit your own material in the material database (see page 30). (Materials conforming to OIML R111 standards cannot be deleted or modified.)
  - **Settings menu**: Define general settings for the task "Mass Calibration" (see page 30).



- ▷ If you are logged on as a user without privileges (e.g. a "trainee"), some of the buttons are grayed out and inactive since the current user does not have any privileges set up for the associated applications.
  - **[Start] Mass calibration**: it is possible to start the task
  - **Show last result**: it is possible to access the results of the last mass calibration, if any.
  - **Reference configuration**: inactive, in the absence of user privileges
  - **Density of material**: inactive, in the absence of user privileges
  - **Settings menu**: inactive, in the absence of user privileges

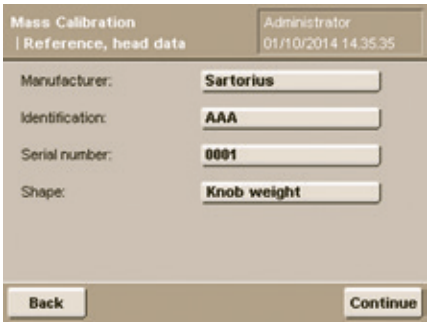
– Creating, modifying or deleting a new reference weight

▶ In the mass calibration main menu, touch **Reference configuration**.



▷ In the reference weight database you can create new reference weights, or modify or delete existing reference weights. There are no pre-defined reference weights.

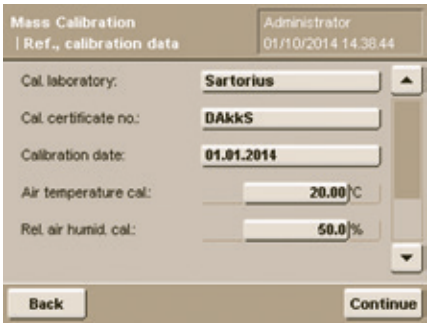
▶ In order to define a new reference weight, touch **Create new reference**.



▶ Enter the header data of the reference weight.

- **Manufacturer**: Name of manufacturer
- **Identification**: Description of the reference weight
- **Serial number**: Serial number to differentiate between multiple reference weights of the same class and mass (e.g. E2, 2 kg)
- **Shape**: **Knob weight**, **Cylindrical weight**, **Wire weight**, **Leaf weight**, **Block weight**, **Ton weight** or **Other.**

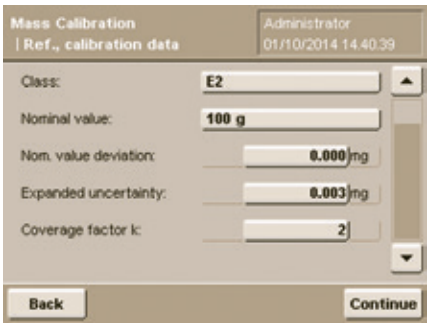
▶ Touch **Continue**.



▶ Enter the calibration data (1st part) of the reference weight.

- **Cal. laboratory**: Name of the laboratory at which the weight was calibrated
- **Cal. certificate no.**: Authority issuing the certificate
- **Calibration date**: Date of the last calibration
- **Air temperature cal.**: Air temperature during calibration
- **Amb. humidity during calib.**: Ambient humidity during the calibration
- **Air pressure cal.**: Air pressure during the calibration
- **Air density cal.**: Air density during the calibration (calculated automatically).

▶ Touch **Continue**.



▶ Enter the calibration data (2nd part) for the reference weight.

If “OIML” or “ASTM” has been selected as a standard (can be configured in the settings menu of the mass calibration, menu item “Test process”, see page 31):

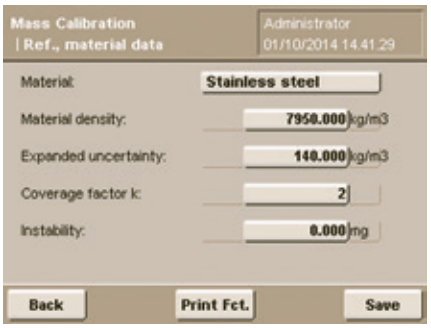
- **Class**: Class according to OIML or ASTM
- **Nominal value**: Selection of the nominal value according to OIML or ASTM
- **Nom. value deviation**: Difference compared to conventional mass

Please note, that weight combinations according to OIML or ASTM standards are usually used as reference weights for the calibration of user-definable nominal values. Combinations of weights are not usable directly, but can be handled by the application “Mass Calibration” only as single-piece reference weights in accordance with the user selectable nominal values. For this purpose, the user must put together the combination of weights and calculate the input values independently.

If “User-definable nominal values” is selected as a standard (this can be configured in the mass calibration settings menu, menu item ‘test process’, see page 31):

- **Nominal value**: Select the nominal value
- **Unit of nom. value**: Select the weight unit of the nominal value
- **Conventional mass**: Conventional mass
- **Expanded uncertainty**: Expanded uncertainty
- **Coverage factor k**: Factor, with which the expanded uncertainty was calculated; standard: 2

▶ Touch **Continue**.



▶ Select the material and if applicable enter the material density deviation, its uncertainty and the expansion factor as well as the instability of the reference weight.

▶ Touch **Save**.

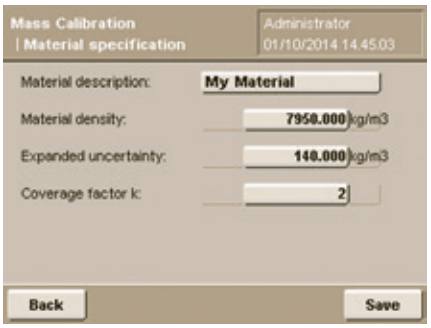
▷ The reference weight is now available in the database for the mass calibration. You can use it both in the current task and in other tasks.

Creating New Materials

▶ In the main menu, touch **Density of material**.

▷ You can create new materials, and modify or delete materials. The pre-defined materials correspond to the values of the OIML standards and cannot be modified.

▶ In order to define a new material touch **Create new material**.



▶ Enter the material description and the data of the material.

▶ Touch **Save**.

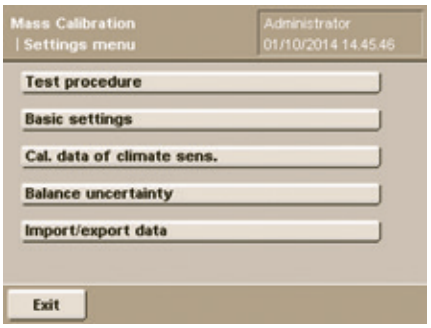
▷ The material is now available for reference weights and test weights.

▶ Touch once **Back**, to return to the function selection.

▶ Touch again **Back**, to return to the mass calibration main menu.

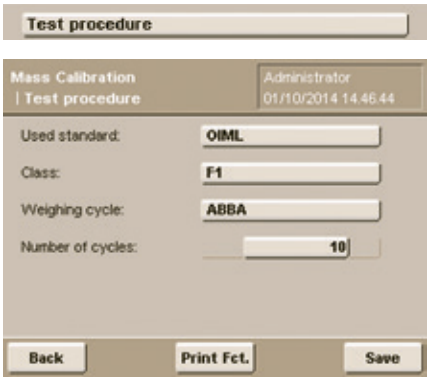
Defining General Settings for the Application „Mass Calibration“

▶ In the main menu, touch **Settings menu**.



▷ The mass calibration settings menu is displayed.

- **Test procedure**: You can define the standard (OIML, ASTM or user-definable nominal value), the weighing cycle and the number of weighing cycles.
- **Basic settings**: You can define the taring behavior and the time period of the measurement, and also enable or disable the draft shield automatically.
- **Cal. data of climate sens.**: If you do not use any integrated climate sensors, you can enter the required calibration data. This information will appear on the printed logs.
- **Balance uncertainty**: You can enter the uncertainty data of the mass comparator.
- **Import/export data**: You can export the data of both databases (reference weights and materials) of the application “Mass Calibration” on to an SD memory card or import it from an SD-memory card (see page 33).



▶ In the settings menu, touch **Test procedure**.

▶ Select Used standard.

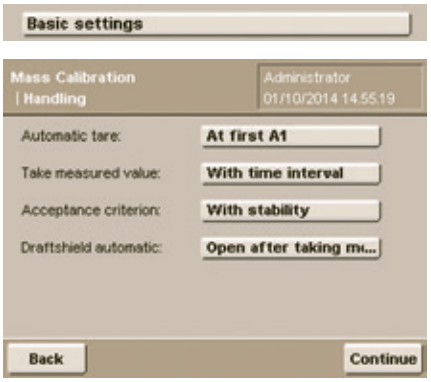
- **OIML**: Recommendations of the “Organization Internationale de Métrologie Légale” (OIML R 111-1)
- **ASTM**: US-Standards of the “American Society for Testing and Materials” (ASTM E617)
- **Free nominal values**: For calibration of user-definable nominal values

▶ Select the **Class** according to OIML or ASTM.

▶ Select the weighing cycle, and define the number of cycles.

- **Weighing cycle**: Selection of the weighing cycle **ABA**, **ABBA** or **AB...BA** (see page 34).
- **Number of cycles**: Number of passes of the selected weighing cycle (1-10).

▶ Touch **Save**.



▶ In the settings menu, touch **Basic settings**.

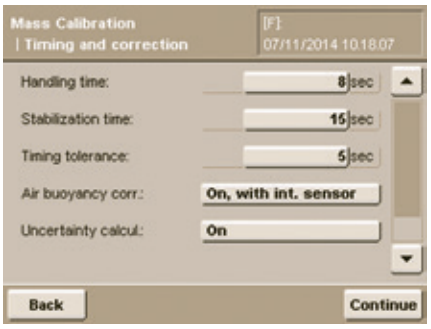
▶ Select the settings for the handling.

- **Automatic tare**:
  Off: No automatic taring is performed.
  At first A1: Taring is performed automatically upon the takeover of the initial measurement value (A1 = 0).
  At A1 of every cycle: Taring is performed automatically upon the takeover of each A1 measurement value.
- **Take measured value**:
  With time interval: The measurement value is taken over after a pre-defined, fixed time window, and if the acceptance criterion has been fulfilled.
  With delay time: The measurement value is taken over after the delay time has lapsed. (The delay time begins upon the appearance of the stability symbol.)
- **Acceptance criterion** (only if “With time interval” has been selected):
  With stability: The measurement value is taken over only if the stability symbol is displayed after the stabilization time has lapsed.
  Without stability: The measurement value is taken over even without the stability symbol.
- **Draftshield automatic**:
  Off: The draft shield must always be operated manually.
  Open after taking measurment: The draft shield opens automatically as soon as the measurement value has been taken over.

▶ Touch **Continue**.

If buoyancy correction and uncertainty calculation are de-selected, no reference from the reference database for mass calibration is required. The results are the mean difference and the standard deviation.

Attention: If the buoyancy correction has been de-selected, but an uncertainty calculation has been performed, the uncertainty of the air density will be assumed with $0\ \frac{kg}{m^3}$ and the air density at the installation site with $1.2\ \frac{kg}{m^3}$.

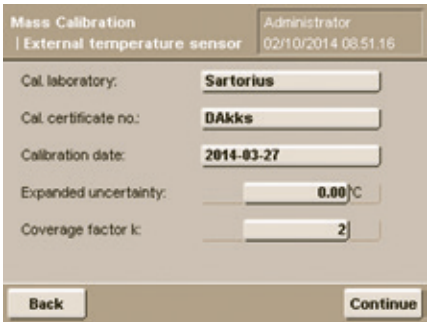


- Select the settings for the time control of the procedure and the use of additional calculations.
  - **Handling time**: Enter a fixed time period for placing and removing the weights.
  - **Stabilization time**: Set the time period after which the measurement value should be taken over (Time interval) or the latest time in which the mass comparator ought to have attained stability, in order to start the delay time (Delay time).
  - **Delay time**: Set the time delay after which the measurement value should be taken over after the appearance of the stability symbol (0-99 s, only if delay time has been selected).
  - **Timing tolerance**: Enter the duration of the maximum time over-shoot which will be tolerated after the handling time and stabilization time have lapsed. When this time has lapsed, the task will be canceled.
  - **Air buoyancy corr.**: Turn the air buoyancy correction **Off** or **On, with int. sensor** or **On, with ext. sensor**.
  - **Uncertainty calcul.**: Enable or disable the uncertainty calculation.
  - **Coverage factor k**: Factor for adjustment of the confidence range of the expanded uncertainty. The default value is 2. You can enter a different factor.
- Touch **Continue**.

- Select the settings for the entry of header data and order data and for the printout.
  - **Input head data**: If you enable the header data by selecting **On**, you will be prompted to enter the test weight header data before the performance of the task. The header will appear on your printout.
  - **Input order data**: If you enable the order data by selecting **On**, you will be prompted to enter the order data before the performance of a task and this data will appear on your printout.
  - **Printout**: You can toggle between **Minimum**, **Maximum** and **Standard**, in order to determine the length of the print order (see examples of the printouts from page 35).
- Touch **Save**.

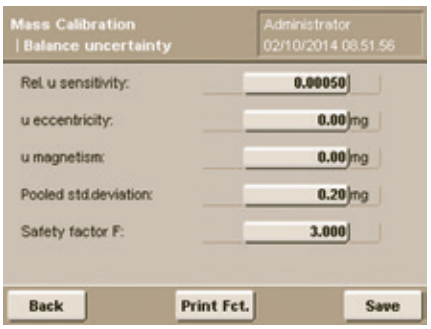
When using an internal climate sensor YCM20MC or YCM20MC-DAKKS the uncertainty values of the sensor will be applied automatically.

- In the settings menu, touch **Cal. data of climate sens.**



If in the settings for the air buoyancy correction the option **On, with ext. sensor** has been selected:

- Enter the calibration data for the external temperature sensor.
- Touch **Continue**.
- Enter the calibration data for the external humidity sensor.
- Touch **Continue**.
- Enter the calibration data for the external pressure sensor.
- Touch **Save**.



- In the settings menu, touch **Balance uncertainty**.
- Enter the uncertainty data of the mass comparator.
  - **Rel. u sensitivity**: Factor for calculation of the uncertainty due to the sensitivity of the mass comparator (see page 41)
  - **u eccentricity**: Uncertainty due to eccentric loading
  - **u magnetism**: Uncertainty due to magnetism
  - **Pooled std. deviation**: Pooled standard deviation of the mass comparator (determined at the place where the mass comparator is installed)
  - **Safety factor F**: Critical value from the F-distribution for checking the accuracy of the mass comparator. (F according to [1, Gl. D.2-2]).
- Touch **Save**.
- In order to switch from the settings menu to the main mass calibration menu, touch **Exit**.

Importing/Exporting Data

You can export and import data from mass calibrations performed via the application “Mass Calibration”.

- In the main menu, touch **Settings menu**.
- In the settings menu, touch **Import/export data**.

▷ Here you can export the entire data set (settings, materials database and reference database) of the application “Mass Calibration” to an SD memory card, or import it from an SD memory card.

- Please ensure that the correct SD memory card has been inserted into the mass comparator (see page 8). If the SD memory card is defective or not properly inserted, an error message is displayed.
- In order to export the data, touch **Export all data to SD card**.
- In order to import the data, touch **Import all data from SD card**.

You can save your data records by exporting them or easily copy your settings and databases to other comparators. This eliminates you having to update your data multiple times.

- In order to switch from the settings menu to the main menu, touch **Exit**.

Selecting the Weighing Cycle

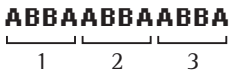
The application “Mass Calibration” alternates between weighing the reference weight “Normal” (A) and the test weight – The “Test piece” – (B). The selected weighing cycle **ABA**, **ABBA** or **AB...BA** determines the sequence in which the weights are placed on the pan.

– **ABA**: This method requires 15 weighing steps over 5 measuring cycles. The measurements are strictly sequential.

Example:

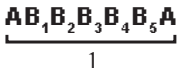
– **ABBA**: This method requires 12 weighing steps over 3 measuring cycles. The measurements are strictly sequential.

Example:



– **AB...BA**: With this method up to 5 test pieces can be simultaneously compared in a single weighing cycle. For 5 test pieces, this method requires 7 weighing steps. The process can be severely impacted due to the drifting of the weighing display and is therefore suitable only for weights of the accuracy class F2 or Class 4 or lower.

Example:



From the individual values, the display difference between the reference weight “Normal” (A) and the test weight “Test piece” (B) is determined multiple times. The mean value and the standard deviation are calculated from the differences.

The standard deviation determined serves as a measure for the accuracy of the mass comparator or the weighing process.

Printout/Sample Log

You can define the printout details in the general settings for tasks (see page 30). You can choose from the following three settings: **Minimum**, **Standard** and **Maximum**. The example shows sample logs for each of the settings.

If you have performed a weighing operation or a mass calibration and want to view the results, you can touch **Print** (see page 25), to print the data out directly on the connected printer, as shown in the following example (see page 35).

Alternatively, you can touch **Trans** and thus have the data transferred to an SD card. The data are saved in TXT format and can be viewed or evaluated with a spreadsheet program.

Minimum

```
----------------------
01/08/2014  17.30.06
    SARTORIUS
  Mass Calibration
----------------------
User:

----------------------

Basic settings:
----------------------
Air buoyancy corr.
On, with int. sensor
Uncertainty calcul.
                  On
Coverage factor k
                   2

Reference weight:
----------------------
Identification
                 AAD
Serial number
            03-0296
Class
                  E2
Nominal value
               1 kg
Conv. mass deviation
           +1.010 mg

Test weight:
----------------------
Identification
                 AAA
Serial number
            03-0014
```

```
Evaluation:
----------------------
Standard dev. meas.
           passed
----------------------
Nom.val. dev. meas.
           passed
----------------------


----------------------
Expanded uncertainty
           passed
----------------------

Results:
----------------------
Conventional mass
                 1 kg
             +2.37 mg
Uncertainty budget
                 5 mg

----------------------
01/08/2014 5.32.55 PM

----------------------
```

Standard

```
----------------------
01/08/2014 5.24.20 PM
    SARTORIUS
  Mass Calibration
----------------------
Model         MCM5004
SerNo.          48428
----------------------
User:

----------------------

Order data:
----------------------
Customer
           SARTORIUS
Order number
          999888777
Order Ident.
          666555444
Remark

Basic settings:
----------------------
Take measured value
   After stabilization
Acceptance criterion
      With stability
Air buoyancy corr.
On, with int. sensor
Uncertainty calcul.
                 On
Coverage factor k
                  2

Reference weight:
----------------------
Manufacturer
           Sartorius
Identification
                AAD
Serial number
            03-0296
Shape
        Knob weight
Class
                 E2
Nominal value
              1 kg
Conv. mass deviation
          +1.010 mg
Expanded uncertainty
            0.250 mg
Coverage factor k
                  2
Instability
            0.000 mg
Material description
      Stainless steel
Material density
      8010.800 kg/m3

Test weight:
----------------------
Manufacturer
           Sartorius
Identification
                AAA
Serial number
             03-0014
Shape
   Cylindrical weight
Material description
      Stainless steel
Material density
      7950.000 kg/m3

Measures values:
----------------------
A11     +1000.0004 g
B11     +1000.0019 g
A12     +1000.0006 g

Diff.conv. mass 1
            0.00136 g
A21     +1000.0005 g
B21     +1000.0018 g
A22     +1000.0003 g

Diff.conv. mass 2
            0.00136 g

Average diff.
            0.00136 g

Uncertainty:
----------------------
u sensitiv. Balance
             0.00 mg
u weighing process
             0.42 mg
u reference weight
             0.13 mg
u buoyancy correct.
             0.00 mg
u balance
             0.04 mg

Evaluation:
----------------------
Standard dev. meas.
             0.07 mg
           passed
----------------------
Nom.val. dev. meas.
             2.37 mg
           passed
----------------------
Expanded uncertainty
             0.89 mg
           passed
----------------------

Results:
----------------------
Conventional mass
                1 kg
           +2.37 mg
Uncertainty budget
                5 mg

----------------------
01/08/2014 5.27.10 PM

----------------------
```

Maximum

```
----------------------
01/08/2014  5.18.03 PM
    SARTORIUS
  Mass Calibration
----------------------
Model         MCM5004
SerNo.          48428
BAC:         00-55-84
APC:         01-60-08
Q-App:       08-xx-00
----------------------
User:

----------------------

Order data:
----------------------
Customer
           SARTORIUS
Order number
           999888777
Order Ident.
           666555444
Remark



Process data:
----------------------
Used standard
                OIML
Class
                  F2
Nominal value
               1 kg
Weighing cycle
                ABA
Number of cycles
                 2

Basic settings:
----------------------
Automatic tare
                Off
Take measured value
   With time interval
Acceptance criterion
      With stability
Handling time
                 8 s
Stabilization time
               10 s
```

```
Timing tolerance
                 5 s
Air buoyancy corr.
On, with int. sensor
Uncertainty calcul.
                On
Coverage factor k
                 2

Climate sensors:
----------------------
u air density
      0.001013 kg/m3

Int. temp. sensor:
----------------------
Cal. laboratory

Cal. certificate no.

Calibration date

Expanded uncertainty
              0.30 'C
Coverage factor k
                 2

Int. humid. sensor:
----------------------
Cal. laboratory

Cal. certificate no.

Calibration date


Expanded uncertainty
                 2 %
Coverage factor k
                 2

Int. press. sensor:
----------------------
Cal. laboratory

Cal. certificate no.

Calibration date

Expanded uncertainty
               2 hPa
```

```
Coverage factor k
                 2

Balance uncertainty:
----------------------
Rel. u sensitivity
             0.00050
u display resolution
             0.04 mg
u eccentricity
             0.00 mg
u magnetism
             0.00 mg
Pooled std.deviation
             0.50 mg
Safety factor Sw/Sp
               3.00

Reference weight:
----------------------
Manufacturer
           Sartorius
Identification
              AAD
Serial number
           03-0296
Shape
        Knob weight
Cal. laboratory
           Sartorius
Cal. certificate no.
              DAkkS
Calibration date
          1.8.2014
Air temperature cal.
           21.85 çC
Rel. air humid. cal.
            48.0 %
Air pressure cal.
        1008.20 hPa
Air density cal.
      1.185422 kg/m3
Class
                E2
Nominal value
               1 kg
Conv. mass deviation
          +1.010 mg
Expanded uncertainty
           0.250 mg
Coverage factor k
                 2
```

```
Instability
           0.000 mg
Material description
       Stainless steel
Material density
      8010.800 kg/m3
Expanded uncertainty
         1.800 kg/m3
Coverage factor k
                 2

Test weight:
---------------------
Manufacturer
          Sartorius
Identification
               AAA
Serial number
            03-0014
Shape
    Cylindrical weight
Material description
       Stainless steel
Material density
      7950.000 kg/m3
Expanded uncertainty
       140.000 kg/m3
Coverage factor k
                 2

Measures values:
---------------------
A11     +1000.0006 g
B11     +1000.0018 g
A12     +1000.0006 g

Air temperature 1
           24.18 'C
Rel. humidity 1
             42.7 %
Air pressure 1
          992.19 hPa
Air density 1
      1.157222 kg/m3
Correction factor 1
         -0.00000004
Diff.conv. mass 1
           0.00116 g

A21     +1000.0006 g
B21     +1000.0019 g
A22     +1000.0006 g

Air temperature 2
           24.19 'C
Rel. humidity 2
             42.2 %
Air pressure 2
          992.17 hPa
Air density 2
      1.157250 kg/m3
Correction factor 2
         -0.00000004
Diff.conv. mass 2
           0.00126 g

Average diff. mass
           0.00121 g

Uncertainty:
---------------------
u sensitiv. Balance
              0.00 mg
u weighing process
              0.42 mg
u reference weight
              0.13 mg
u buoyancy correct.
              0.00 mg
u balance
              0.04 mg

Evaluation:
---------------------
Standard dev. meas.
              0.07 mg
            passed
Pooled std.deviation
              0.50 mg
Safety factor Sw/Sp
                 3.00
---------------------
Nom.val. dev. meas.
              2.22 mg
            passed
Nom.val. dev. budget
                11 mg
---------------------
Expanded uncertainty
              0.89 mg
            passed
Uncertainty budget
                 5 mg
---------------------

Results:
---------------------
Conventional mass
                 1 kg
           +2.22 mg
Uncertainty budget
                 5 mg

---------------------
01/08/2014 5.21.32 PM
Name:

---------------------
```

Formulas and Symbols for Mass Calibration

Formula according to OIML R 111

Description	Symbol/Formula	Unit	OIML R 111
Display difference from the measurement series i (ABA)	$\Delta I_i = I_{t_1 i} - (I_{r_1 i} + I_{r_2 i})/2$	mg. g. kg.	[1, Formula C.4.1-2]
Display difference from the measurement series i (ABBA)	$\Delta I_i = (I_{t_1 i} - I_{r_1 i} - I_{r_2 i} + I_{t_2 i})/2$	mg. g. kg.	[1, Formula C.4.1-1]
in which i is as follows:	$i = 1, ..., n$: mit $1 \leq n \leq 10$		
Display difference from the measurement series with multiple test weights j ($AB_1...B_nA$)	$\Delta I_{(j)} = I_{t(j)} - (I_{r_1} + I_{r_2})/2$	mg. g. kg.	cf. [1, Gl. C.4.2-1]
in which j is as follows:	$j = 1, ..., J$: mit $1 \leq J \leq 5$		
Approximation formula for the air density	$\rho_a = \frac{0.34848\, p - 0.009\, (hr) * \exp(0.061\, t)}{273.15 + t}$	kg m^{-3}	[1, Formula E.3-1]
Correction factor for the air buoyancy for the cycle i (If the air buoyancy correction is done with external sensors then only one C_i is calculated for the entire measurement.)	$C_i = (\rho_{ai} - \rho_0) * \left(\frac{1}{\rho_t} - \frac{1}{\rho_r}\right)$		[1, Formula C.5.1-3]
Difference of the conventional mass corrected by the air buoyancy with $\Delta I_i = \Delta I_{(j)}$ for $AB_1...B_nA$ i = (j)	$\Delta m_{ci} = \Delta I_i + m_{cr} C_i$	mg. g. kg.	[1, Formula C.5.1-2]
Mean difference of the conventional mass	$\overline{\Delta m_c} = \frac{1}{i} \sum_{i_n=1}^{n} \Delta m_{ci}$	mg. g. kg.	[1, Formula C. 5.1-4]
Variance deviation of the conventional mass	$s^2(\Delta m_c) = \frac{1}{n-1} \sum_{i=1}^{n} \left(\Delta m_{ci} - \overline{\Delta m_c}\right)^2$	mg	[1, Formula C.6.1-3]
Conventional mass of the test object	$m_{ct} = m_{cr} + \overline{\Delta m_c}$	mg. g. kg.	[1, Formula C.5.4-1]
Variance of the air density	$u^2(\rho_a) = u_F^2 + \left(\frac{\partial \rho_a}{\partial p} u_p\right)^2 + \left(\frac{\partial \rho_a}{\partial t} u_t\right)^2 + \left(\frac{\partial \rho_a}{\partial hr} u_{hr}\right)^2$	kg m^{-3}	[1, Formula C.6.3-3]
with:	$u_F = 2 \times 10^{-4} \rho_a$	kg m^{-3}	[1, Section E.3]
	$\frac{\partial \rho_a}{\partial \rho} = 10^{-5} \rho_a\, Pa^{-1}$	kg m^{-3}	cf.. [4, Section 2.2]
	$\frac{\partial \rho_a}{\partial t} = -4 \times 10^{-3} \rho_a\, K^{-1}$	kg m^{-3}	cf.. [4, Section 2.2]
	$\frac{\partial \rho_a}{\partial hr} = -9 \times 10^{-3} \rho_a$, with $0 \leq hr \leq 1$	kg m^{-3}	cf.. [4, Section 2.2]

Description	Symbol/Formula	Unit	OIML R 111
Standard uncertainty due to the weighing process with s_p as per [1, Gl. D.2-1]	$u_w(\overline{\Delta m_c}) = \frac{s_p}{\sqrt{n}}$	mg	cf. [1, Gl. C.6.1-1]
To check the accuracy of the mass comparator, the following applies: (Safety factor $F \leq$ critical value from the F distribution)	$s_w^2 \leq F \times s_p^2$		cf. [1, Section D.2]
Uncertainty due to the division of the digital display	$u_d = \left(\frac{d/2}{\sqrt{3}}\right) * \sqrt{2}$	mg	[1, Formula C.6.4-2]
Uncertainty due to the sensitivity of the mass comparator, simplified [1, Gl. C.6.4-1] (5×10^{-4} is the default value for the relative uncertainty of the sensitivity, cf. p.33)	$u_s \approx \lvert \overline{\Delta m_c} \rvert \quad \frac{u(m_s)}{m_s}$ $\approx 5 \times 10^{-4} \lvert \overline{\Delta m_c} \rvert$	mg	See [3, sections 3.4.6.2 and 3.4.6.3]
Combined standard uncertainty of the mass comparator	$u_{ba} = \sqrt{u_s^2 + u_d^2 + u_E^2 + u_{ma}^2}$	mg	[1, Formula C.6.4-5]
Uncertainty of the air buoyancy correction with $\rho_{al} = \rho_0$	$u_b = m_{cr} \sqrt{\left[\frac{(\rho_r - \rho_t)}{\rho_r \rho_t} u(\rho_a)\right]^2 + (\rho_a - \rho_0)^2 \left(\frac{u^2(\rho_t)}{\rho_t^4} + \frac{u^2(\rho_r)}{\rho_r^4}\right)}$	mg	cf. [1, Gl. C.6.3-1] [3, Gl. 34.67]
The following applies if no air buoyancy correction has been performed:	$u_b = 0$ $C = 0$	mg	[1, Section C.6.3.2]
Standard uncertainty of the conventional mass of the standard	$u(m_{cr}) = \sqrt{\left(\frac{U}{k}\right)^2 + u_{inst}^2(m_{cr})}$	mg	[1, Formula C.6.2-1]
Combined standard uncertainty of the conventional mass of the test object	$u_c(m_{ct}) = \sqrt{u_w^2(\overline{\Delta m_c}) + u^2(m_{cr}) + u_b^2 + u_{ba}^2}$	mg	[1, Formula C.6.5-1]
Expanded uncertainty of the conventional mass	$U(m_{ct}) = k\, u_c(m_{ct})$	mg	[1, Formula C.6.5-3]

Symbols in accordance with OIML R 111

Symbol	Unit	Definition
(A), r	mg. g. kg.	Subscript for reference weight
(B), t	mg. g. kg.	Subscript for test weight
I	mg. g. kg.	Indication of the mass comparator (scale divisions)
ΔI	mg. g. kg.	Indication difference of the mass comparator with $\Delta I_i = I_t - I_r$, for this cycle
i		Subscript for the number of weighing cycles
J		Number of test weights
j		Subscript for the number of test weights
n		Subscript for number of measurement sequences
p	hPa	Air pressure

Symbol	Unit	Definition
hr	%	Relative humidity
t	°C	(Air) temperature in °C with $t = T - 273.15$ K
ρ_a	kg m^{-3}	Air density of the moist air
C		Correction factor for air buoyancy
ρ_0	kg m^{-3}	Reference density of the air (1.2 kg m^{-3})
ρ_r	kg m^{-3}	Density of the reference weight (Normal) with the mass m_r
ρ_t	kg m^{-3}	Density of the test weight (test piece)
m_{ct}	mg. g. kg.	Conventional mass of the test weight
m_{cr}	mg. g. kg.	Conventional mass of the reference weight
$\overline{\Delta m_c}$	mg. g. kg.	Average difference of the conventional mass
s	mg. g. kg.	Standard deviation
s_w	mg. g. kg.	Standard deviation of the weighing process:
s_p	mg. g. kg.	Pooled standard deviation
u_c	mg. g. kg.	Combined standard uncertainty
$u_c(m_{ct})$	mg. g. kg.	Uncertainty of the conventional mass of the test weight (test piece)
$U(m_{ct})$	mg. g. kg.	Expanded uncertainty of the conventional mass of the test weight (test piece)
k		Coverage factor, typically 2
u_w	mg. g. kg.	Uncertainty due to the weighing process
u_{ba}	mg. g. kg.	Uncertainty of the balance:
u_b		Uncertainty of the air buoyancy correction:
$u(m_{cr})$	mg. g. kg.	Uncertainty of the conventional mass of the reference weight (Normal)
$u(m_r)$	mg. g. kg.	Uncertainty of the Normal
u_s	mg. g. kg.	Uncertainty due to the sensitivity of the balance
u_d	mg. g. kg.	Uncertainty due to the display resolution of a digital balance
u_E	mg. g. kg.	Uncertainty due to eccentricity
u_{ma}	mg. g. kg.	Uncertainty due to magnetism
$u(\rho_a)$		Uncertainty of the air density:
$u(\rho_t)$		Uncertainty of the density of the test weight (test piece)
$u(\rho_r)$		Uncertainty of the density of the reference weight (Normal)
U		Expanded uncertainty :
u		Standard uncertainty
F		Safety factor, critical value from the F Distribution

References

[1] OIML R111-1, Weights of classes E1, E2, F1, F2, M1, M1-2, M2, M2-3 and M3, Part 1: Metrological and technical requirements, Edition 2004 (E)

[2] ASTM E617-13, Standard Specification for Laboratory Weights and Precision, Mass Standards, 100 Barr Harbor drive, PO Box C700, West Conshohocken, PA 19428-2959, United States, 2013

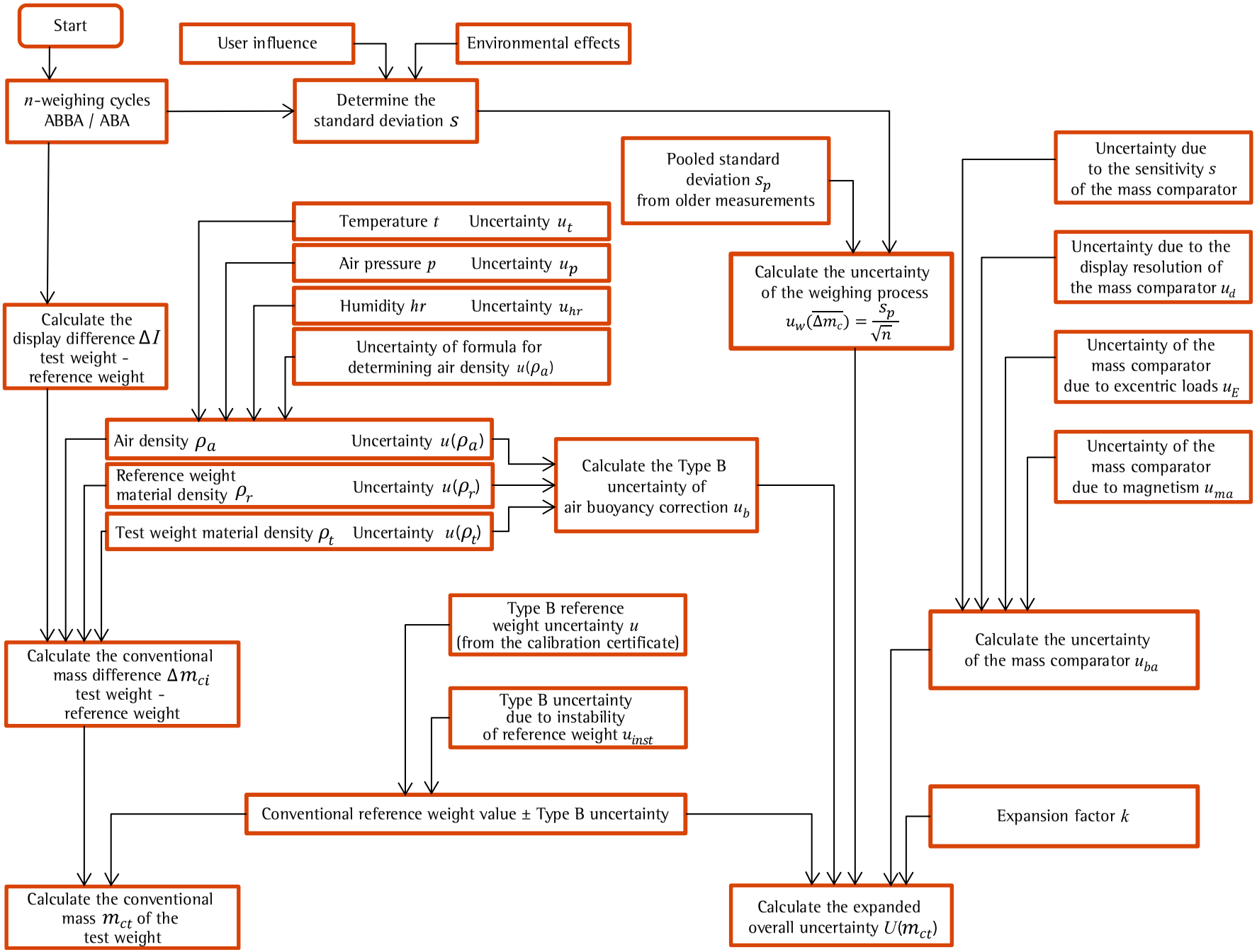
[3] Kochsiek, M. Gläser, M., "Comprehensive Mass Metrology", Wiley-VCH Verlag Berlin (2000), Sec. 3.4, "Mass determination with balances" (Roman Schwartz)

[4] Picard, A., Davis, R.S., Gläser, M., Fujii, K., "Revised formula for the density of moist air (CIPM-2007)", Metrologia 45 (2008) 149 - 155

[5] GUM 1995, Guide to the expression of uncertainty in measurement, JCGM 100:2008, 2008

Flowchart for calculating conventional mass

A flow chart for calculation of conventional mass and its uncertainty is shown in the following figure.


Start
User influence
Environmental effects
n-weighing cycles ABBA / ABA
Determine the standard deviation s
Pooled standard deviation s_p from older measurements
Uncertainty due to the sensitivity s of the mass comparator
Temperature t Uncertainty u_t
Air pressure p Uncertainty u_p
Humidity hr Uncertainty u_{hr}
Uncertainty of formula for determining air density $u(\rho_a)$
Calculate the uncertainty of the weighing process $u_w(\overline{\Delta m_c}) = \frac{s_p}{\sqrt{n}}$
Uncertainty due to the display resolution of the mass comparator u_d
Calculate the display difference ΔI test weight - reference weight
Uncertainty of the mass comparator due to excentric loads u_E
Air density ρ_a Uncertainty $u(\rho_a)$
Reference weight material density ρ_r Uncertainty $u(\rho_r)$
Test weight material density ρ_t Uncertainty $u(\rho_t)$
Calculate the Type B uncertainty of air buoyancy correction u_b
Uncertainty of the mass comparator due to magnetism u_{ma}
Type B reference weight uncertainty u (from the calibration certificate)
Calculate the uncertainty of the mass comparator u_{ba}
Calculate the conventional mass difference Δm_{ci} test weight - reference weight
Type B uncertainty due to instability of reference weight u_{inst}
Conventional reference weight value ± Type B uncertainty
Expansion factor k
Calculate the conventional mass m_{ct} of the test weight
Calculate the expanded overall uncertainty $U(m_{ct})$

Mass Comparator Calibration/Adjustment

Background

During calibration, a calibration weight is used to determine how much the displayed value deviates from the actual measurement value. This deviation is compared with an entered target value and is then eliminated by subsequent adjustment. During the linearization, the deviation of the values from the ideal characteristic curve is cleared.

When and how often

Calibration/adjustment should be carried out on a regular basis, e.g., daily after the mass comparator is switched on. In addition, it should be done after each leveling and always when the ambient conditions have changed (temperature, humidity or air pressure), and when the balance has been set up at a different location.

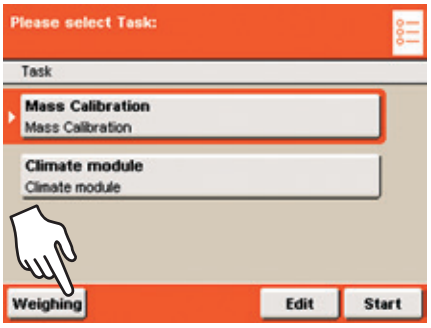
isoCal

All Cubis® mass comparators are equipped with the automatic calibration / adjustment function 'isoCal' (timer and temperature-controlled). You can adapt this function according to your requirements. You also have the option of setting up a reminder function that prompts for calibration/adjustment at user-definable intervals.

The process sequence may differ depending on the presets which have been defined for the calibration/adjustment function. The factory settings have not been changed for the procedure described here.

Calibration/Adjustment Using Internal Calibration Weight

(☰)

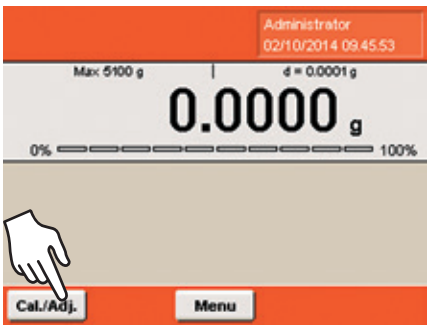


- ▶ Press the key **TASK** (☰).
- ▷ A list of available tasks is displayed.
- ▶ Touch **Weighing**.
- ▷ You are in the operating mode.

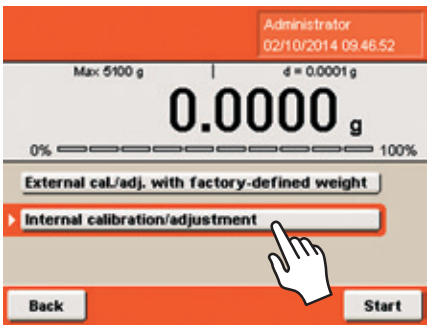
- ▶ Make sure that the weighing plate is unloaded.

(**TARE**)

- ▶ Press **TARE**, in order to tare the mass comparator.



▶ Touch **Cal./Adj.**



▶ Touch **Internal calibration/adjustment** and then **Start**.

▷ While the function is active, **Cal.Int.** will be displayed.

▶ Wait until the process is completed and **Cal.Int.** is no longer displayed.

▷ The internal calibration has been completed, the results are displayed.

▶ Touch **Back**, in order to switch from the results display back to the operating mode or wait until the calibration / adjustment selection appears again.

▷ The calibration / adjustment selection appears.

▶ Touch **Back**, in order to switch from the selection back to the operating mode or select a different calibration function.

Calibration/Adjustment Using External Calibration Weight

An external calibration weight is required for this function. Please note the tolerance of the calibration weight being used.

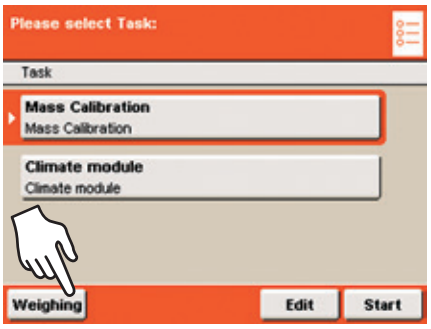
(☰)

▶ Press the key **TASK** (☰).

▷ A list of available tasks is displayed.

▶ Touch **Weighing**.

▷ You are in the operating mode.

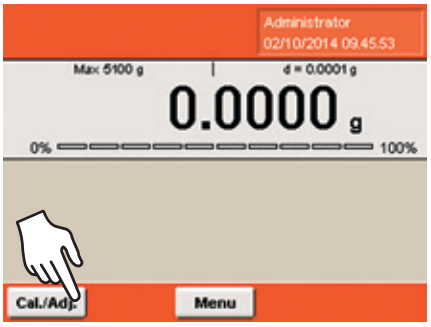


▶ Make sure that the weighing plate is unloaded.

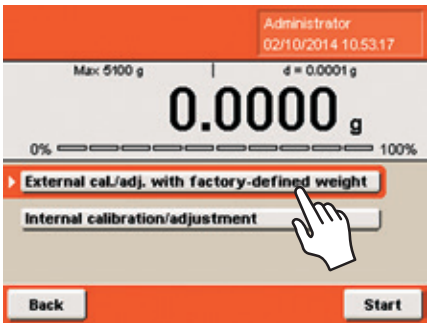
(TARE)

▶ Press **TARE**, to tare the mass comparator.

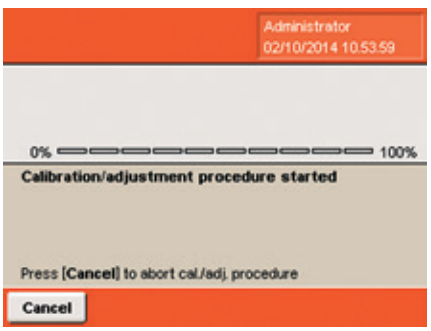
▶ Touch **Cal./Adj.**



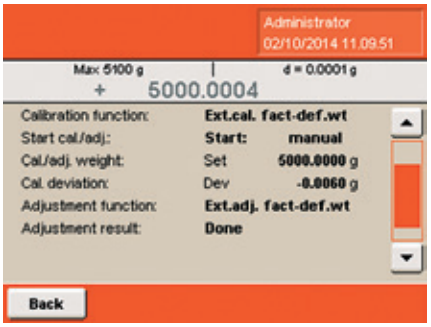
▶ In the calibration / adjustment selection, touch **External cal./adj. with factory-defined weight** or a different, external test weight.



▷ The calibration is started. The weighing plate is not yet loaded.

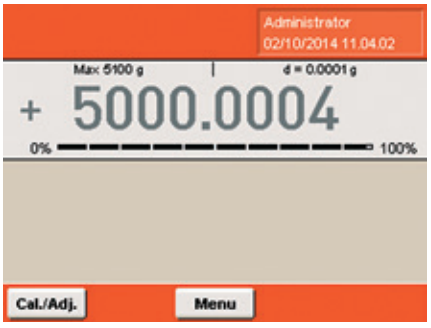


▷ The display changes.
▷ You are prompted to place the test weight.
▶ Touch **Start**.



▷ After the calibration / adjustment the results will be displayed.
▶ Touch the scroll bar and scroll downwards to view all the results.

▶ Touch **Back**.



▷ You are taken back to the operating mode.

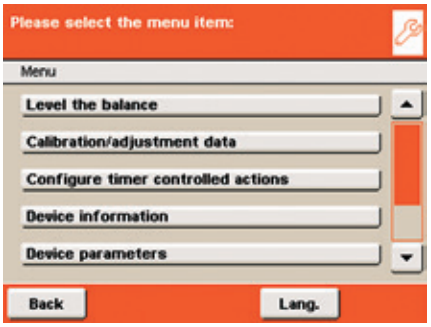
System Settings (Menu)

This menu contains all settings relevant to the device. Basic settings can be made here that immediately affect the device. Changed settings do not affect previously defined tasks and user profiles.

All system settings are user-independent; in other words, they are applied to all users

As long as a task is active and/or a user has been selected, several basic settings cannot be changed. In order to enable all settings to be changed, “Weighing” has to be selected in the operating mode and no user profile may be selected.

- ▶ In order to open the system settings, touch **Menu** in the operating mode.



- ▷ The selection of the system settings is displayed.
- ▶ To view all menu items, use the right scroll bar.
- ▶ Touch the menu item whose settings you want to change.

System settings are divided into the following menus:

- Leveling the mass comparator (see next section, page 48)
- Configuring calibration / adjustment (see page 51)
- Setting up time-controlled actions(see page 52)
- Displaying device information (see page 55)
- Configuring the device (see page 56)
- Importing / exporting data (see page 63)
- Activating the service mode (see page 64)

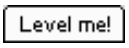
You have already learned how to use the menus. In the following, only configuration options are described and explained.

Leveling the Mass Comparator (Q-Level)

The mass comparator must be leveled, in order to enable it to provide accurate weighing results. During the leveling process, the unevenness of a weighing plate is eliminated by adjusting the leveling feed of the mass comparator. Leveling is always required if the mass comparator is set up at a different location, or is moved at its original location.

Depending on the model, the mass comparator is equipped with motorized or manually activated leveling feet. An integrated sensor detects the alignment of the mass comparator and triggers a warning message when leveling is required. You can configure the leveling note and the leveling (see page 56).

The mass comparator needs to be re-leveled and adjusted each time its setup location is changed.



As soon the display shows the message **Leveling me!** , you must perform the leveling process. The process is quick and easy.

▶ Touch the tab **Level me!**,

or:

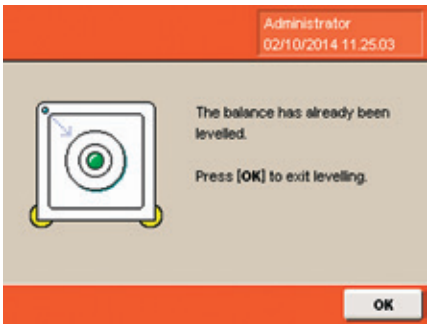
▶ in the menu select the option **Level the balance**.

▶ Make sure that Weighing plate is unloaded.

Mass Comparators with Motorized Leveling Feet (Automatic Leveling)

The models MCM2004, MCM5004, MCM5003 and MCM10K3 with the motorized leveling feet can only be automatically leveled. All other models show you, by means of arrows on the display, the direction in which the leveling feet need to be turned in order to level the unit.

▶ Touch **Start**, to start the automatic leveling process.



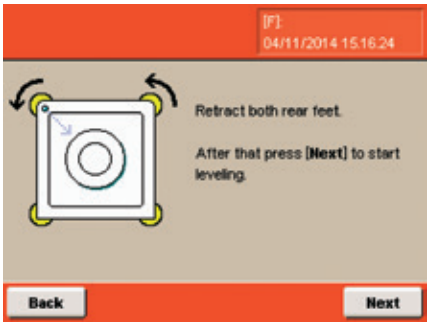
▷ A message is displayed as soon as the automatic leveling is completed.

▶ Acknowledge the message by touching **OK**.

▷ This takes you back to the selection of the system settings.

Manually Leveling the Mass Comparator

Mass Comparator with Four Leveling Feet



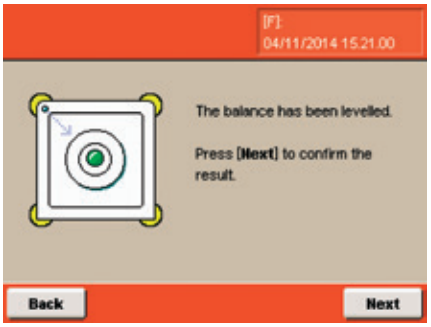
▶ Turn the two rear leveling feet fully according to the direction of rotation shown on the display.

▶ Touch **Next**.

[F]
04/11/2014 15:18:31
Please turn each foot in the direction of the arrow as shown until the level icon is centered.
Press [Next] to confirm the result.
Back
Next

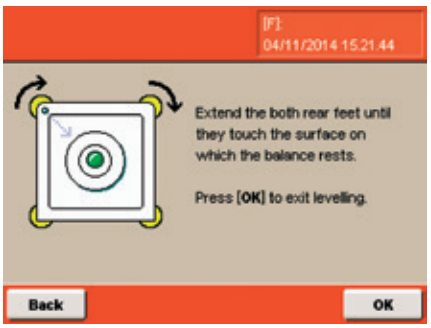
▷ The display indicates by means of arrows, which of the front feet need to be turned in which direction.

▶ Follow the instructions on the display.



▷ A message is displayed after the correct setting of the front leveling feet.

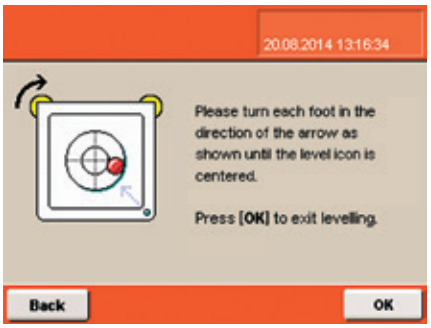
▶ Acknowledge the message by touching **Next**.


[F]
04/11/2014 15:21:44
Extend the both rear feet until they touch the surface on which the balance rests.
Press [OK] to exit levelling.
Back
OK

▶ Turn both the rear leveling feet in accordance with the direction of rotation shown on the display until they touch the surface on which the mass comparator is being set up.

▶ End the leveling process by touching **OK**.

Mass Comparators with two leveling feet.


20.08.2014 13:16:34
Please turn each foot in the direction of the arrow as shown until the level icon is centered.
Press [OK] to exit levelling.
Back
OK

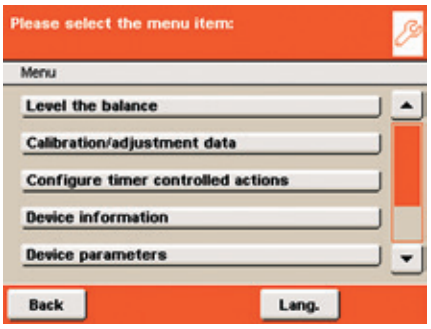
▷ The display indicates by means of arrows, which of the rear feet need to be turned in which direction.

▶ Follow the instructions on the display.

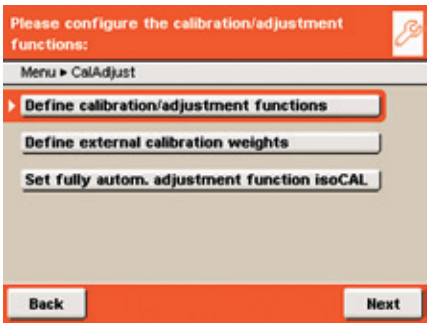
▷ After the correct setting of the leveling feet, a message is displayed.

▶ End the leveling process by touching **OK**.

Configuring Calibration/Adjustment



- ▶ In the operating mode, touch **Menu**.
- ▷ The selection of the system settings is displayed.
- ▶ Touch **Calibration/adjustment data**.



- ▷ The selection of the settings options is displayed (the settings options will be described in the following chapters).
- – Define calibration/adjustment functions
- – Define External Calibration Weights
- – Set fully automatic adjustment function isoCAL

- ▶ Select the section in which you want to make settings.
- ▶ Configure the desired settings for all sub-menus.
- ▶ To save the settings touch **Save**.

In the following text. factory settings are identified with "*".

Defining Calibration and Adjustment Functions

- ▶ In the menu, touch **Calibration/adjustment data**, in order to access the selection of the settings options.
- ▶ In the selection section of the settings options, touch **Define calibration / adjustment functions**:

  Cal./Adj.-key: Functions of the key: Block key / *Configure key selection menu / Select fixed 1-key function

  Cal./Adj. Selection menu: Select which calibration/adjustment functions are listed when the Cal./Adj. key is touched.

  Cal./Adj. Sequence: Options: *Calibrate, then adjust automatically / adjust / calibrate or subsequently adjust manually

  Cal./Adj. Unit: Options: *Gram / Kilogram / Defined via data record

Define External Calibration Weights

- ▶ In the menu, touch **Calibration/adjustment data**, in order to access the selection of the settings options.
- ▶ In the selection of the settings options, touch **Define external calibration weights**:

  No. of external calibration weights: Enter the number

  Ext. calibration weight n: Enter the data for each calibration weight: weight value (in grams), ID, certificate, validation

Set Fully Automatic Adjustment Function isoCAL

▶ In the menu, touch **Calibration/adjustment data**, in order to access the selection of the settings options.

▶ In the selection of the settings options, touch **Set fully autom. adjustment function isoCAL**.

isoCAL: Define the function setting: Off / only alert levels, manual start / On, automatic execution

isoCAL alert levels: *isoCAL status field only (the “Tab”)/Alert message, repeating/ Alarm message adjustment urgently required

isoCAL temperature: Enter temperature difference (in Kelvin).

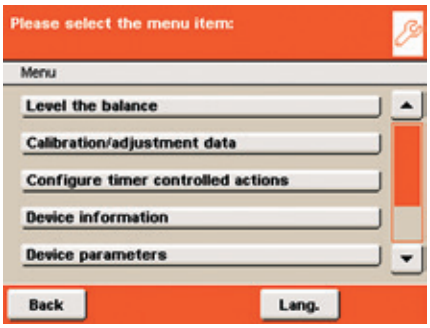
isoCAL interval time: Enter interval time in hours.

Configure Timer Controlled Actions

You can program the following actions so that they run automatically at preset times:

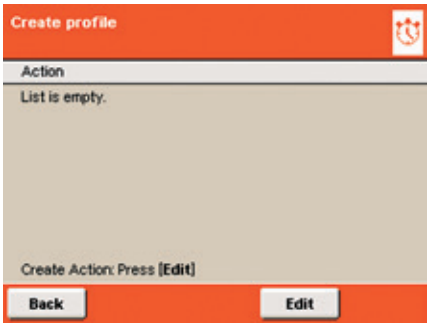
- Display message and execute a command (see example below)
- Execute a command
- Show a message (e.g. a prompt as a reminder)

▶ In the operating mode, touch **Menu**.



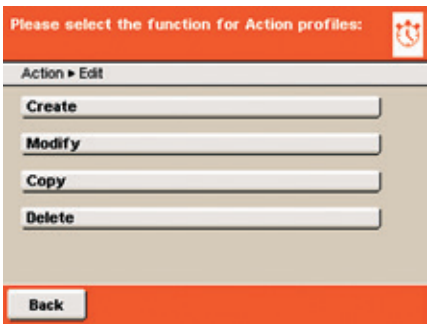
▷ The selection of the system settings is displayed.

▶ Touch **Configure timer-controlled actions**.



▷ The available actions are displayed. When you open this menu for the first time, the list will be empty.

▶ Touch **Edit**.

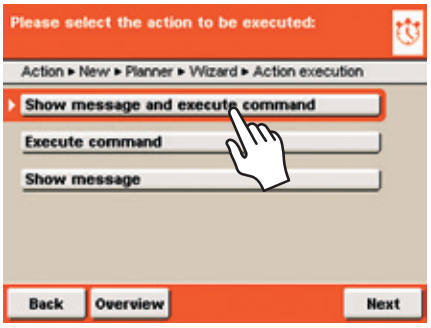


▷ The editing options available are displayed.

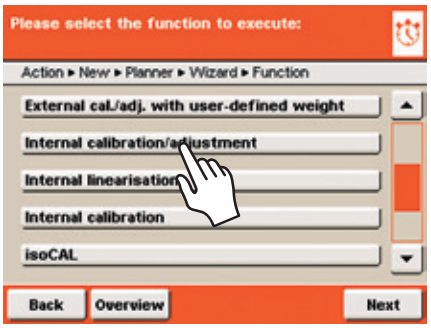
▶ If you want to set up a new time-controlled action, touch **Create**. Later you can also modify, copy, or delete each action here.

Example

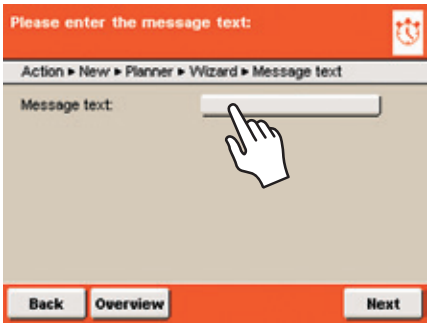
You want the function “Internal calibration / adjustment” to run every morning at 7:00 a.m. In addition, you want a message to be displayed.



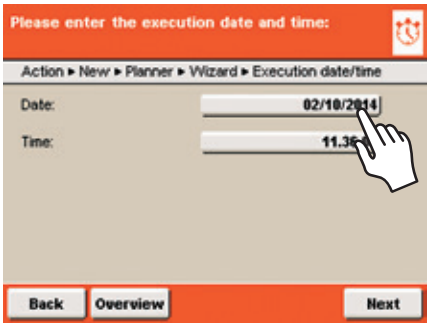
▶ Select the action which you want to set up, e.g, “Display Message and execute command”.



▶ Select the action which you want to set up, e.g. “Internal Calibration and Adjustment”



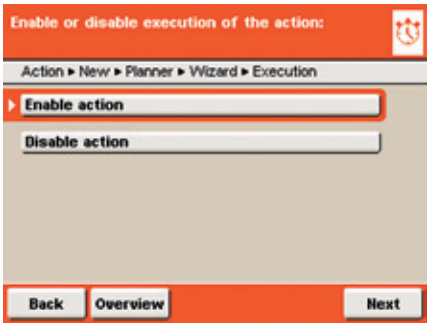
▶ Enter the text which should be displayed during the execution of the action, e.g. “Time-controlled adjustment”.



▶ Enter the date and time at which the action should be executed for the first time.

▶ Define the time interval at which you want the action to be repeated (e.g., one day for daily occurrence).

▶ Touch **Next**.



▶ Select **Enable action**.

▷ The action programed, will start at the specified time. You can at any time enable or disable the window “Enable / Disable Action” , in order to disable the action or to enable it once again with a new start time.

▷ The overview of all settings for the action is displayed.

▶ Check and correct all settings as required.

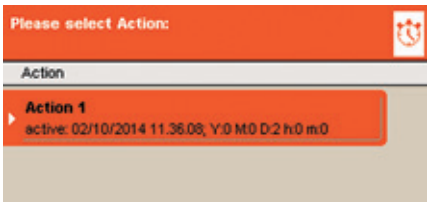
▶ Touch **Next**.

▶ Enter a name and a description for the action.

▶ Touch **Save**.

▶ Touch **Back**.

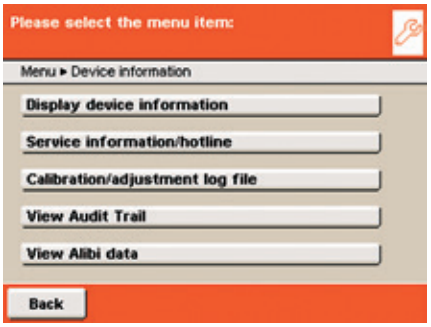
▷ In the operating mode, a tab “Timer” is displayed. If you touch the tab, you can access a list of the actions.



▷ The programmed action is displayed in the list. You can edit them again at any time here.

Display Device Information

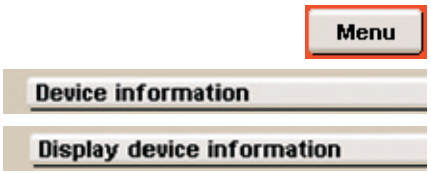
▶ In the operating mode, touch **Menu** and then **Device information**.



▷ You can view various information here.

▶ Select the information that you want to view.

Base Data



Here you can find all information about the manufacturer, model, serial number, host name, and IP address used.

▶ Touch **Version** if you want to have the version number of the mass comparator, the display and control unit and the application software displayed.

▶ Touch **Ranges** if you want to have the weighing ranges and digits (resolution) displayed.

Service Information and Hotline

Service contact information is displayed here along with the hotline number and maintenance contract and interval information,

Calibration / Adjustment Log File

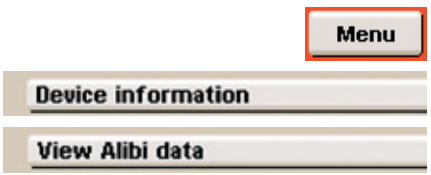
The log file is displayed here with the results of all calibration and adjustment routines.

Audit Trail

All changes to the menu, user profiles, and task profiles are logged in the audit trail.

This function logs: User, profile, parameter ID, parameter, old and new setting.

Log File



The messages recorded by the system (Log files) are displayed here, e.g. error messages.

Configuring Device Parameters

▶ In the operating mode touch **Menu** and then **Device parameters**.

Here you can update the software and change the following device settings. Settings are applied to all user profiles.

- Set properties of the mass comparator
- Configure data output
- Enter the device ID
- Set date and time
- Configure the properties of the display unit
- Adjusting Touch Screen
- Configure the interfaces
- Alibi Memory Configuration
- Update Software
- Software activation codes
- Restoring Factory Settings

Optional:

- Motorized draft shield
- Ionizer

Setting the Properties in the Operating Mode 'Weighing'

In the following text. factory settings are identified with "*".

General Weighing Settings

Here you can define the default settings for the general functions of the mass comparator. These settings can be changed for a specific task whenever a new task is created.

These settings can only be changed if the mass comparator is set to "Weighing" in the operating mode. If **Configure balance parameters** cannot be selected, use **TASK** (☰) to switch over to Task Management and select **Weighing**.

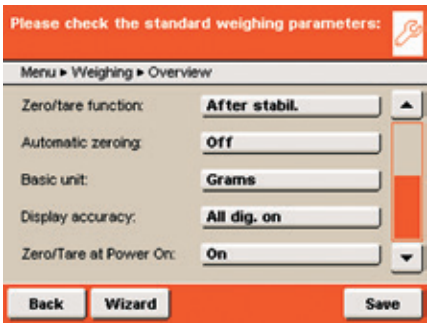
In order to obtain detailed information about the individual setting options of the sub-menu, touch **Info**.

Filter adaptation: The effects of unfavorable weighing conditions such as drafts or vibration can be filtered out by adapting the balance filter (and thus its measuring time) to suit ambient conditions. Options: Very stable conditions / *Stable conditions / Unstable conditions / Very unstable conditions

Application filter: Equalizes the load deviations on the display. Options: ***Final readout/Dosing/Low filtering/Without filtering**

Stability range: The stability indicator lights up when the weighing results are constant within a set range. Options: **Maximum accuracy/Very high accuracy/ *Medium accuracy/Fast/Very Fast/Maximum speed**

Stability delay: This setting lets you compensate for slowly abating disturbances, such as turbulence in the weighing chamber. Options: ***Very short delay/ Short delay/Medium delay/Long Delay**



Zero/tare function: Conditions for performing the tare function. **Without stability/*After stability/During stability**

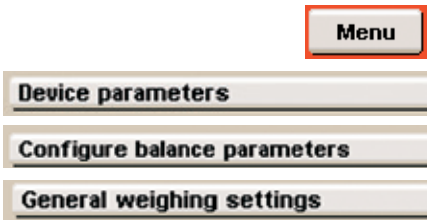
Automatic zeroing: If this option is enabled, changes of a fixed, configured fraction of scale intervals per second starting from the display zero point are automatically tared. Options: **On/*Off**

Basic unit: Unit of weight which should be used for this task; Options: all available units of weight/***Grams**

Display accuracy: A low display accuracy gives a faster display. Options: ***All dig. on/Reduced by one decimal place in case of load change/Last decimal place of the 1st Division/Last decimal place off**

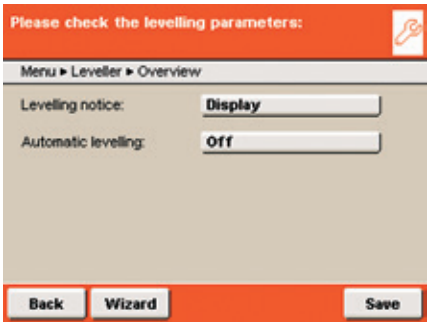
Zero/Tare at Power On: When switched on, the mass comparator is automatically tared. Options: ***On/Off**

▶ Touch **Save**, to save your settings.



Setting up Q-Level leveling function

You can configure the leveling function here.



Leveling notice

Switched off/Switching off, no indication: Leveling prompt is disabled.

Display/Status Display: As soon as leveling is required the Tab **Level Me!** appears and flashes.

Alert / Alarm message, Leveling mandatory: As soon as leveling is required the Tab **Level Me!** appears and flashes. If this notice is ignored, an alarm message appears after five minutes. If this occurs, work can only be resumed after leveling has been performed.

Automatic leveling (only for mass comparators with motorized leveling feet)

Off / Switch off, Start with key: To activate automatic leveling, touch **Start**.

Switched on / Switch on fully automatic: The mass comparator is leveled automatically before every calibration/adjustment routine.

▶ Touch **Save**, to save your settings.

Menu

Device parameters

Configure balance parameters

Power On Mode

Defining the Startup Mode of the Mass Comparator

▶ Select the mode that is used when the mass comparator is turned on and when the operating key (⏻) is pressed repeatedly (**Startup behavior**).
Optional: **ON / Stand-by** or **Always ON**

▶ Touch **Save**, to save your settings.

Menu

Device parameters

Configure balance parameters

Power saving mode

Defining the Energy-Saving Mode of the Mass Comparator

▶ Switch the power saving mode of the device on or off,
Switched off / Switch off, No function: The power saving mode is not in use.
Automatic shutoff after 2 minutes: The backlight on the display and control unit switches off if the device is idle for 2 minutes.

▶ Touch **Save**, to save your settings

Menu

Device parameters

Configure balance parameters

Reset gen. weigh. settings to fact.

Restoring Factory Settings

You can reset all settings of the mass comparator to factory condition (after the prompt “Do you want to restore factory settings?”).

▶ Touch **Yes** or **No**.

Configuring Data Output (Print Parameters)

Note: In the following text. factory settings are identified with “*”,

Menu

Device parameters

Configure data output

Here you can configure all settings for printing and data output.
Some of these settings depend on the interface configuration:

▶ In this regard, please read the chapter “Interfaces” in the user manual.

Info

To obtain detailed information about the individual setting options, first touch **Wizard** and then **Info**.

Printout interface: Options: COM port peripherals, Port A PC (USB), Port B, Optional, Port C, Network, Port D, Print to file

Log: Options: Print/SBI/XBPI/Web Service/SICS/Secondary display
This setting cannot be changed here. It is defined when configuring the interface. The display of the parameters and settings depends on the protocol selected.

GLP standard print: When should ISO/GLP printing be possible?
Options: *Off/Turned on for Cal./Adjust./Always on.

Tare after printout: Automatic tare after printing?
Options: *Off/On

Print event: What event should trigger printing?
Options: *PRINT Key/Start of task/Initialization of application/Result of application/ Printing component/Evaluation of application/Exit task/Calibration - adjustment

Print key elements: Which elements should be printed?

For more information see the chapter “Interfaces” in the user manual.

Enter the device ID

With these two IDs you can expand the printer protocol.

- Select the input for both the IDs.
- Enter the desired value (text) for each identifier.
- Touch **Save**, to save your settings.

For associated input and output commands for data output please see the user handbook, Chapter “Interfaces”, Section “SBI Commands”.

Setting the date and time

- Enter the current date and time in the prescribed format.

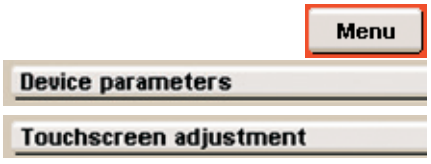
Configuring Display and Control Unit Properties

The following properties of the display and control unit can be changed as necessary:

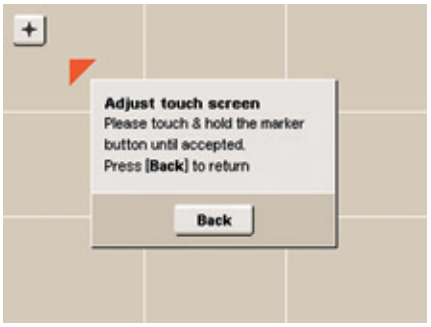
Language, **Background colors**, **User field colors**, **Brightness** and **Acoustic signals**

These general properties are applied to all user profiles, are also used when no user is logged in, and serve as a template when a new user profile is created.

Adjusting the Touch Screen



Here you can customize the marker button on the touch screen (finger pressure, angle of touch, etc.),



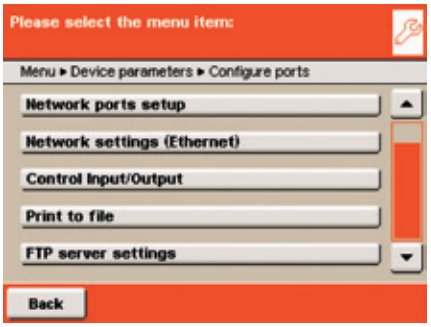
▶ Follow the instructions on the display.

Configuring Interfaces and Network Settings

Here you can configure serial interfaces and make settings for the network.

Besides this, you can make settings for:

- Control inputs / outputs
- Print to file
- FTP server settings

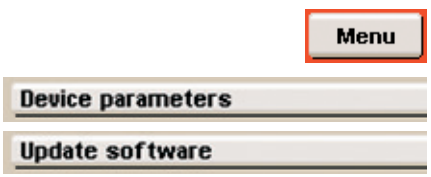


A detailed description of the connection options and data interface ports can be found in the user manual, in the chapter “Interfaces”.

A detailed description of all the sub-menus, can be found in the user manual in the chapter “Configuring Interfaces and Network Settings”.

▶ Touch **Save**, to save your settings.

Update Software

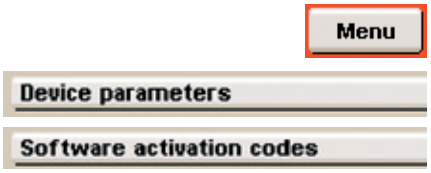


▶ Follow the instructions on the display.

▷ After the software has been updated, the balance will restart.

The Cubis®-Software is regularly updated. A detailed description of how you can perform a software update on your mass comparator can be found in the user handbook in the chapter “Updating your Software”.

Software Activation Codes



Here you will find the activation code administration.

▶ Touch **WebService** or **MassCal** or **ClimaMod**, in order to have the codes displayed.

Restoring Factory Settings

You can reset all settings individually to the factory settings at any time.

▶ Slide the scroll bar in the **Device parameters** sub-menu downwards to the right, to access the **Restore factory settings** menu item.

▶ Highlight all settings which you want to reset, and touch **Next**.

▶ Confirm the security query.

Setting Up the Motorized Draft Shield (Model Dependent)

Operating elements for electronic draft shield (depending on the model)

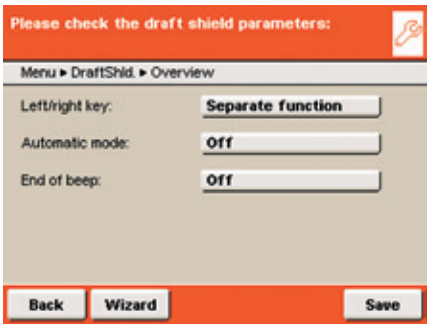
If your mass comparator is equipped with a motorized draft shield the control unit has keys on the right and left sides of the display and control unit, which can be used for the motor-driven opening and closing of the draft shield doors. You can configure the functionality of these keys in the menu.

Models with analytical draft shields:

For example, you can configure the left key to open and close the right and upper door (for users who are right-handed) and the right key to open and close the left door (for users who are left-handed). The opening width (entirely or partially) of the sliding panels can also be defined.

These settings must be made manually for the draft shield (see “Opening function of the keys (Learn Function)” on the next page).

▶ In the **Device parameters** menu, touch **Draft shield**.



- ▶ Check and correct all settings as required
- ▶ To save the settings touch **Save**.

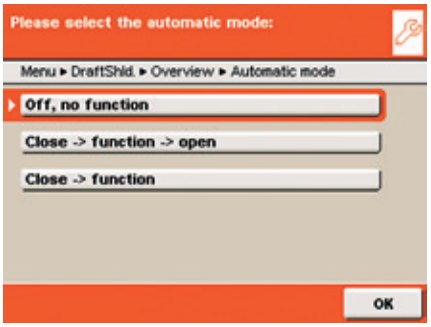
Please select the function of the left/right key:
Menu ▸ DraftShld. ▸ Overview ▸ Left/right key
Off, no function
Same function
Separate function
OK

- ▶ Define the functions for the left and right keys:

  Off, no function: The keys have no function.

  Same function: Both keys have identical functions.

  Separate function: The left and right keys are configured with different functions.


Please select the automatic mode:
Menu ▸ DraftShld. ▸ Overview ▸ Automatic mode
Off, no function
Close -> function -> open
Close -> function
OK

- ▶ Define the automatic mode for the draft shield,

  Off, no function: The automatic function is switched off.

  "Close -> function -> open": The draft shield doors are closed in automatic mode while the function is executed, and then the doors re-open.

  Close -> function: The draft shield doors are closed in automatic mode while the function is executed.

Automatic mode can be executed using the following keys:

- Key **TARE**
- Key **PRINT**
- Softkey **Cal/Adj.**
- **Component takeover** in case of logging applications (Statistics, formulations, totalizations)

If the automatic mode is switched on, the draft shield doors automatically close when the mass comparator is switched to standby,

Assigning Opening Functions to Keys (Learning Function)

Example: The keys should be cross-configured (left key opens/closes right door and vice versa). The mass comparator must be turned on.

- ▶ Close all the draft shield doors.
- ▶ Manually operate the door you want to assign to the left key:

  Push the right door open as far as you want it to be opened, entirely or partially.

- ▶ Press the left key ▲▼.

▷ The door will close again.

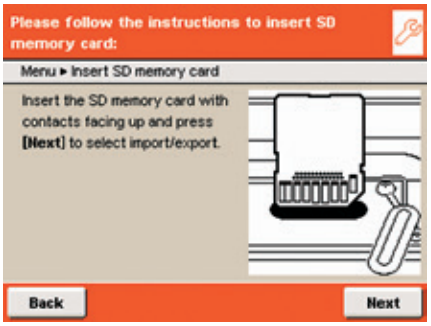
Now you have configured the left key so that, when pressed, it opens or closes the right door.

▶ Proceed accordingly to configure the left door and the right key.

Using the same method, you can assign operation of the upper door to one of the keys. You can also configure one key to move both doors by manually opening both doors during set up before you press the desired key.

Importing/Exporting Data

▶ In the operating mode, touch **Menu** and then **Import/export data**.


Please follow the instructions to insert SD memory card:
Menu ▸ Insert SD memory card
Insert the SD memory card with contacts facing up and press [Next] to select import/export.
Back
Next

▶ If you have not already done so, iInsert the SD card into the slot provided (see “Inserting an SD card into the control unit”) and touch **Next**.

▶ If the ‘Continue’ button is not visible, check whether the SD card is properly inserted and latched in place.

▶ Choose whether you want to export data to the SD card or import it from the SD card or whether you want to import a Q-App-Option from the SD card.

Export:

▶ Highlight the data that you want to export and touch **Next.**

▶ Edit the name of the export folder, if desired, and touch **OK**.

▶ Touch **Next**.

▷ The data is copied to the SD memory card,

▷ An icon is shown on the display during the data transfer.

▷ The device cannot be operated during this time.

Import:

▶ Touch the folder from which you want to import data from the SD card**.**

▶ Highlight the data that you want to export and touch **Next.**

▷ The user profiles are copied from the SD card.

▷ An icon is shown on the display during the data transfer.

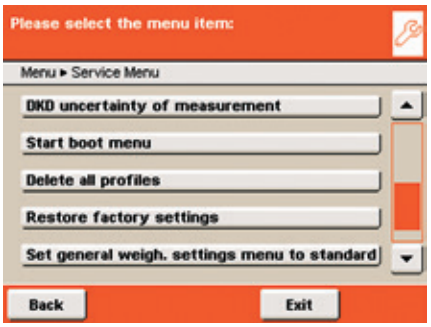
▷ The device cannot be operated during this time.

The data is available in XML-Format and can be viewed in a browser on a PC.

Activating the Service Mode

The service mode gives you the option to make basic settings centrally from this menu. Depending upon the configuration of the mass comparator when delivered, and on user access rights, some menu items can be operated only to a limited extent. You will find a detailed description of the settings in the user manual.

▶ In the operating mode touch **Menu** and then on **Service**.



▶ Select the sub-menu in which you want to view the status information or change the settings.

▶ Confirm queries with **Yes** or **No** and touch **Exit**, if you have completed the configuration.

▷ Changes become effective immediately,

▶ To quit the menu, touch **Back**.

You can access the following views or make settings:

- View the log file
- Disable the Audit Trail
- Configure the service information
- Disable the action “Next Maintenance”
- Delete passwords
- Start the boot menu
- Delete all profiles (task, user and menu profiles)
- Restore factory settings (Detailed selection)
- Set the menu of the weighing settings (properties in the operating mode ‘Weighing’) to standard or to calibration mode

User Management

You can configure the following settings in this menu:

- Creating new user profiles (only possible as administrator)
- Editing user profiles (modify, copy, delete, change and delete passwords, depending on user rights)
- Activating users

User management includes users with different rights: the administrator and regular users.

The administrator can use all functions (except those in Service) and he has all user rights. Only he can create new user profiles and assign individual rights. There is only one administrator.

A user, on the other hand, cannot use all functions. He/she has limited rights, which are defined in the user profile.

When the mass comparator is first delivered, there are no user profiles, all settings can be carried out. The first user profile that is created is automatically an administrator. He can then create additional user profiles.

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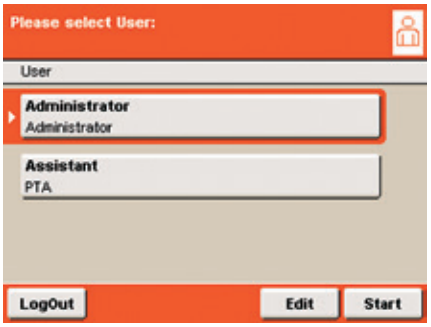


▶ Press the key USER ( ).

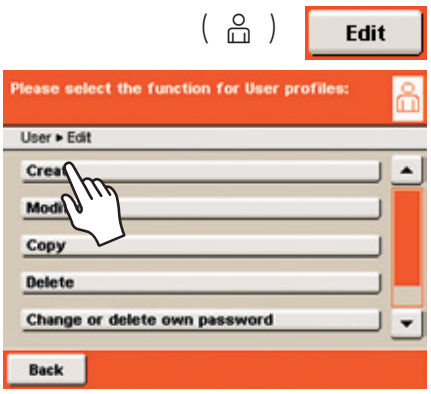
▷ The User Management menu opens, and the selection of user profiles is displayed.

Creating User Profiles

This function can only be carried out by an administrator.

The following settings can be made in the user profile and are only valid for that user:

- Language
- Display settings (color, brightness)
- Volume and acoustic signal on/off
- User rights
- Password Protection
- User name and description.



▶ To create a new user profile, touch **Edit.**

▶ Touch **Create.**

The program now automatically guides you through the menu. Make your selections by touching the desired option, the program then takes you to the next prompt.

Or:

If the desired option is already selected (dark background), touch **Next** to go to the next prompt.

Even if more than one option can be selected, after making your selection touch **Next** to go to the next prompt.

Step 1: Setting the Language

Touch the desired language.

Steps 2 to 4: Setting the color and brightness of the display

▶ To select the background color, touch the desired color.

The Sartorius default color for the background is a shade of gray (**Sahara**). Together with the user box setting **Sun down** this is set at the factory.

▷ The display changes to the color selection for the user field (see “Display in Operating Mode”).

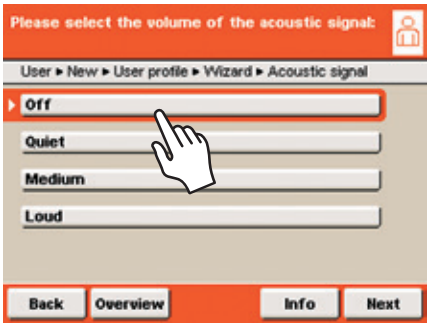
▶ Touch the desired color for the user field.

The Sartorius standard color for the user field is a shade of orange (Setting **Sun down**), which is preset at the factory prior to delivery of the mass comparator.

▷ The display changes according to the brightness setting.

▶ To change the brightness of the display, touch the desired setting.

Step 5: Setting acoustic signals

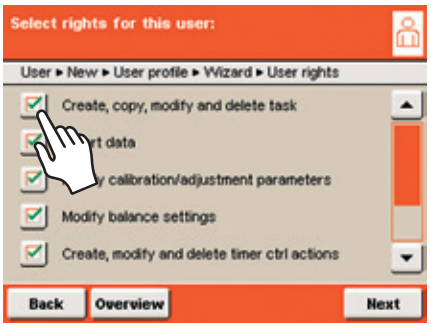


If the signal is on, a short beep-tone is emitted each time an operating element on the display is used.

▶ Select the desired volume.

Or:

▶ Touch **Off**, to disable the acoustic signal.


Select rights for this user:
User ▸ New ▸ User profile ▸ Wizard ▸ User rights
Create, copy, modify and delete task
Modify balance settings
Create, modify and delete timer ctrl actions
Back
Overview
Next

Step 6: Assigning User Rights

▶ Define user rights.

There is one administrator with all rights, users with modification rights for tasks, and users without modification rights for tasks. Besides this you can grant access rights for:

- Importing data
- Modifying calibration and adjustment settings
- Modifying the weighing settings of the mass comparator
- Creating, modifying or deleting time-controlled actions
- Exporting data
- Display device information

▶ To move to the next menu item, touch **Next**.

Do you wish to protect this user profile with password?
User ▸ New ▸ User profile ▸ Wizard ▸ Password
No, no password protection
Yes, password protection
Back
Overview
Next

Step 7: Configuring Password Protection

If you protect a user profile by assigning it a password, this profile can be used only after the password has been activated.

▶ Select the corresponding option to define whether the user profile is password-protected or not.

▷ The password will be defined in the step after next.

Only the administrator can open the user profile without the password (for example, if the user forgets the password) and assign a different password. The administrator can remove the password protection so that a new password can be set, if desired.

If the administrator forgets the password:

▶ Please contact your Sartorius Service Center

Step 8: Checking All Settings

▶ Use the scroll bar or press the down arrow to view all settings.

▶ To modify a setting, press the corresponding button. This opens a screen showing the options for that setting.

▶ If the settings are correct, touch **Next**.

Step 9: Defining the Password (if Password Protection Enabled)

▷ If you selected the option for password protection, you are now prompted to enter the desired password twice.

▶ Press the upper button.

▶ Enter the desired password (min. 4 characters, max. 8 characters, only capital letters and numerals).

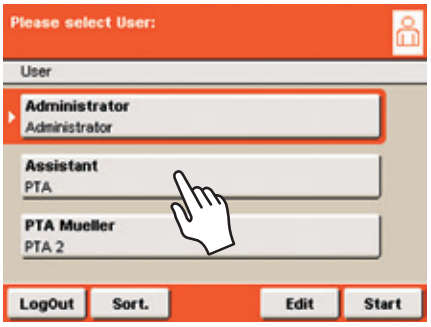
▶ Press the lower button, and enter the password again.

▶ Touch **Next**.

Step 10: Entering User Names and Descriptions

- ▶ To enter a name for the user profile, touch the button **User**.

  The user name is shown on the top right of the display during operation as long as the respective user profile is active.
- ▶ Enter the user name (max. 40 characters) and touch **OK**.
- ▶ To enter a description of the user profile, touch the button **User description**.
- ▶ The user description can be viewed at any time during operation by pressing the user info area on the display (see “User Interface”).
- ▶ Enter the description and touch **OK**.
- ▶ To complete the process. touch **Save**.



- ▷ The program switches to user selection. The newly created user profile is placed at the end of the list.
- ▶ When you want to activate a new user, just touch the button with his name.
- ▷ The program switches to the operating mode and the selected user is activated.

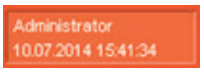
Or:

- ▶ If you want to set up additional user profiles, touch **Edit** and repeat the steps described.

Or:

- ▶ When you want to switch to the operating mode without switching the user, touch **Start**.

Activating Users



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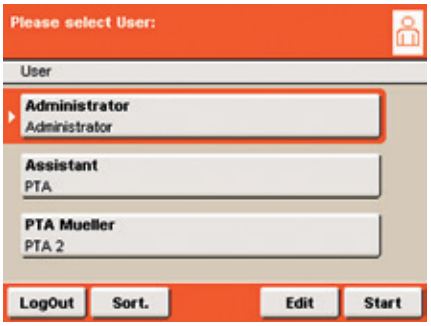


In the operating mode, the active user is displayed at the top right of the user field. To activate another user profile, you must open the ‘User Management’ menu.

- ▶ Press the USER key ( ).
- ▷ The user selection list is displayed. The current, active user can be recognized by the small arrow and the dark background.
- ▶ Touch the user you want to activate.

If a password has been set for this user:

- ▶ Enter the password and confirm the entry.
- ▷ The program switches back to operating mode with the selected user activated and displayed at the top right of the user field.

Editing User Profiles

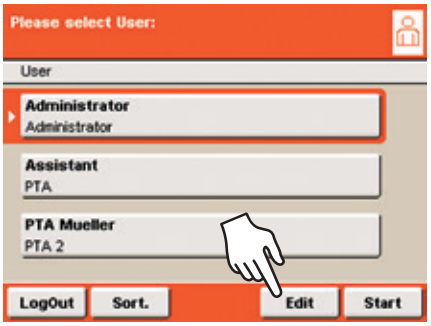
Which options for editing user profiles are available depends on whether or not you have administrator rights, The following table shows who can carry out which changes to user profiles.

Accordingly, the displays shown in this section may differ from your screen because in this chapter, the administrator view is always shown here,

Option	Administrator	User
Change own profile	☑	☑
Change other profile	☑	
Copy profile	☑	
Delete profile	☑	
Changing or deleting your own password	☑	☑
Changing or deleting other user passwords	☑	

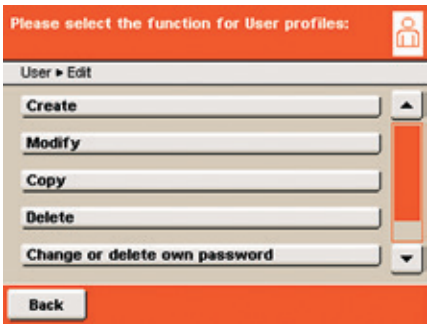
(👤)

▶ If you have not already done so, open the User Management menu by touching the USER (👤) key.



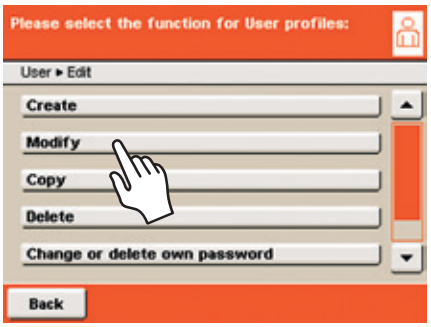
▷ The user selection list is displayed.

▶ In the user selection list touch **Edit**.



▷ The function selection is displayed.

Changing User Profiles



▶ Touch **Modify**.

▶ If you are an administrator, you must now select the profile that you want to change and touch **Next**.

▷ The overview of all settings for this profile is displayed You can now select and change the parameters one by one.

Or:

▶ If you want to use the automatic user guide (step-by-step), touch **Wizard**. Now all setting options will be displayed one by one to be changed.

▶ Touch **Next**.

▶ If required, change the user name and description.

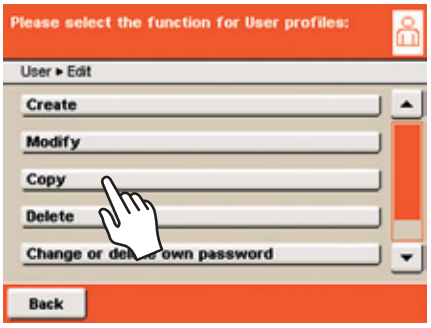
▶ Touch **Save**.

▷ The user profile has been changed. The display changes to the user selection.

Copying User Profiles

This function can only be performed by the administrator.

When you copy a user profile with password protection, the password is not transferred to the copy, but is deleted instead!



▶ Touch **Copy**.

▷ All available user profiles are displayed.

▶ Select the profile that you want to copy.

▶ Touch **Next**.

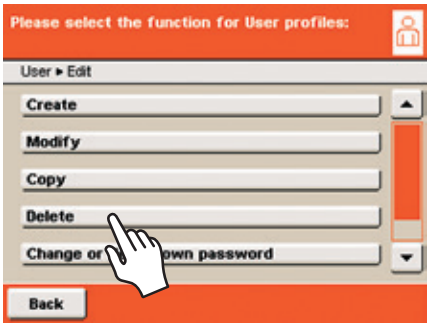
▶ Enter a new name and description for the copied user profile.

▶ Touch **Save**.

▷ The display switches over to the user selection list, which now includes the new profile.

Deleting User Profiles

This function can only be performed by the administrator.



▶ Touch **Delete**.

▷ All available user profiles are displayed.

▶ Select the profiles that you want to delete and touch **Next**.

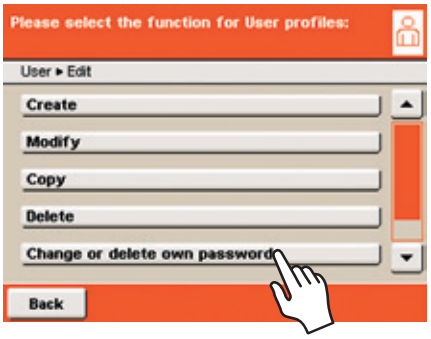
Or:

▶ If you want to delete all the user profiles touch **All**.

▷ All profiles selected for deletion are displayed in a security prompt.

▶ If you even now, still want to change the selection, touch **No** or confirm the deletion with **Yes**.

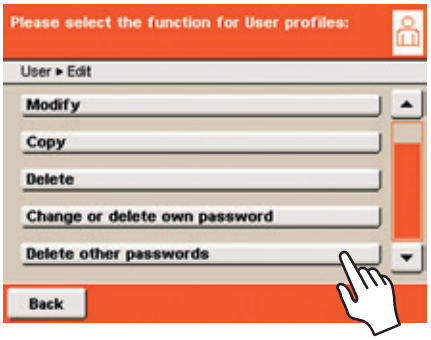
Changing or Deleting Your Own Password



- ▶ If you haven't already done so, activate your own user profile.
- ▶ In the user selection list touch **Edit**.
- ▶ Select **Change or delete own password**.
- ▶ If you want to change the password, touch **Yes**.
- ▶ Select both buttons in order and enter the new password twice.
- ▶ Touch **Next**.
- ▷ This takes you back to the user selection.

Deleting Other User Passwords

This function can only be performed out by the administrator.



- ▶ Activate your own profile.
- ▶ In the user selection list touch **Edit**
- ▶ Select **Delete other passwords**.
- ▷ An overview of all users with passwords is displayed.
- ▶ Select all users whose passwords you want to delete and then touch **Next**.

Or:

- ▶ If you want to delete all the passwords, touch **All**.
- ▷ All users whose passwords you selected for deletion are displayed in a security prompt.
- ▶ If you still want to change the selection touch **No**.

Or:

- ▶ Confirm the deletion with **Yes**.
- ▷ You return to user selection.

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